Water Resources Survey

Part I:

HISTORY OF LAND AND WATER USE ON IRRIGATED AREAS

and

Part II:

MAPS SHOWING IRRIGATED AREAS IN COLORS DESIGNATING THE SOURCES OF SUPPLY

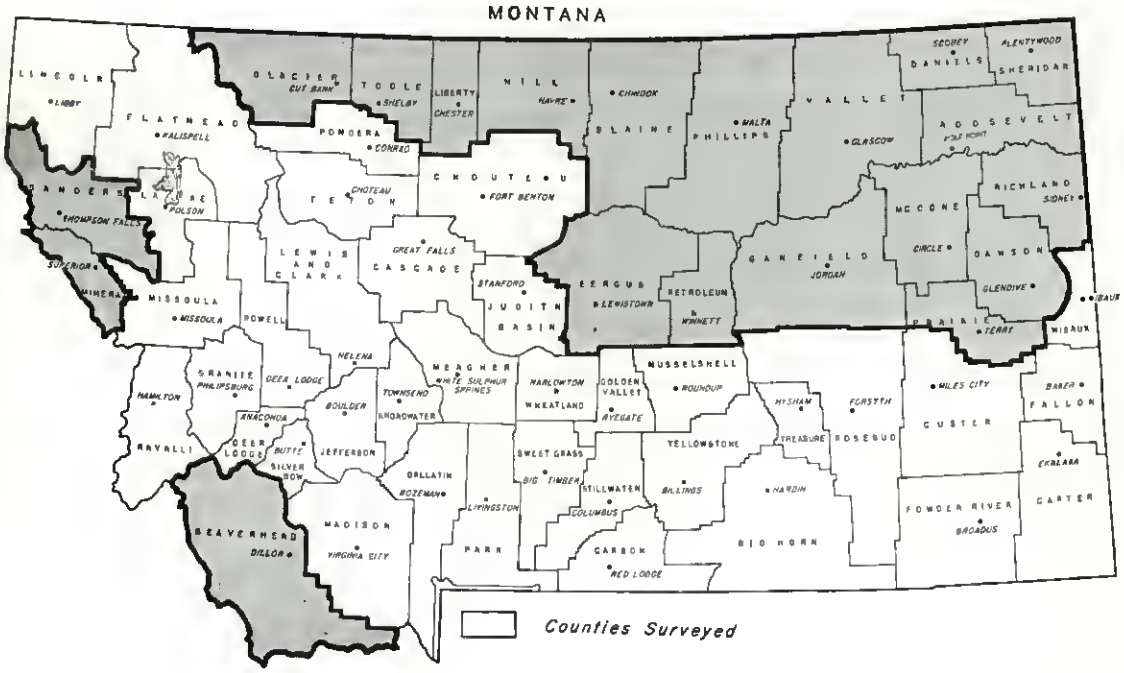
Flathead and Lincoln Counties, Montana

Published by
STATE ENGINEER'S OFFICE
Helena, Montana, June, 1965

WATER RESOURCES SURVEY

FLATHEAD AND LINCOLN COUNTIES MONTANA

Part 1
History of Land and Water Use on Irrigated Areas



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Everett V. Darlinton ..... State Engineer
Director of Water Resources, Ground and Surface Water

Hans L. Bille ..... Assistant State Engineer
Water Resources Survey and Publication of County Reports

Miller Hansen ..... Deputy State Engineer

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June, 1965

Honorable Tim M. Babcock
Governor of Montana
Capitol Building
Helena, Montana

Dear Governor Babcock:

Submitted herewith is a consolidated report on the Water Resources Survey of Flathead and Lincoln Counties, Montana.

This work was accomplished with funds made available to the State Engineer by the 38th Legislative Session, 1963, and in co-operation with the State Water Conservation Board and the Montana State Agricultural Experiment Station.

The report is divided into two parts: Part I consists of history of land and water use, irrigated lands, water rights, etc., and Part II contains the township maps in the County showing in colors the land irrigated from each source or canal system.

Work has been completed and reports are now available for the following counties: Big Horn, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Deer Lodge, Fallon, **Flathead,** Gallatin, Golden Valley, Granite, Jefferson, Judith Basin, Lake, Lewis and Clark, **Lincoln,** Madison, Meagher, Missoula, Musselshell, Park, Pondera, Powder River, Powell, Ravalli, Rosebud, Silver Bow, Stillwater, Sweetgrass, Teton, Treasure, Wibaux, Wheatland, and Yellowstone.

The office files contain minute descriptions and details of each individual water right and land use, which are too voluminous to be included herein. These office files are available for inspection to those who are interested.

The historical data on water rights contained in these reports can never become obsolete. If new information is added from time to time as new developments occur, the records can always be kept current and up-to-date.

Respectfully submitted,

EVERETT V. DARLINTON, State Engineer

ACKNOWLEDGMENTS

A survey and study of water resources involves many phases of both field and office work in order to gather the necessary data to make the information complete and comprehensive. Appreciation of the splendid cooperation of various agencies and individuals who gave their time and assistance in aiding us in gathering the data for the preparation of this report is hereby acknowledged.

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OTHER AGENCIES AND INDIVIDUALS

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Dr. M. G. Burlingame.....Department Head of History, Montana State College

Mrs. Grace E. Hansen.....Superintendent of Schools, Flathead County

R. A. Dightman.....Meteorologist in Charge, U. S. Dept. of Commerce, Weather Bureau

Alvin R. Southard.....State Soil Survey Leader, Department of Plant & Soil Science, Montana State College

Philip E. Farnes.....Assistant Snow Survey Supt., U.S.D.A., S.C.S.

Willis M. Johns.....Chief Geologist, Bureau of Mines and Geology

H. D. Hurd.....State Soil Conservationist, U.S.D.A., S.C.S.

N. R. Tripp.....Assistant Regional Forester, U.S.D.A., Forest Service

Frank Stermitz.....District Engineer, U.S. Geological Survey

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Henry Lenarz.....Chairman of Commissioners, Glen Lake Irrigation District

Lynn Purdy.....Glen Lake Irrigation District

TABLE OF CONTENTS

FLATHEAD AND LINCOLN COUNTIES

FOREWORD

SURFACE WATER

Our concern over surface water rights in Montana is nearly a century old. When the first Territorial Legislature, meeting in Bannack, adopted the common law of England on January 11, 1865, the Territory's legal profession assumed that it had adopted the Doctrine of Riparian Rights. This doctrine had evolved in England and in the eastern United States where the annual rainfall is generally more than twenty inches. It gave the owners of land bordering a stream the right to have that stream flow past their land undiminished in quantity and unaltered in quality and to use it for household and livestock purposes. The law restricted the use of water to riparian owners and forbade them to reduce appreciably the stream flow, but the early miners and ranchers in Montana favored the Doctrine of Prior Appropriation which permitted diversion and diminution of the streams. Consequently, the next day the legislature enacted another law which permitted diversion by both riparian and non-riparian owners. Whether or not this action provided Montana with one or two definitions of water rights was not settled until 1921 when the Montana Supreme Court in the Mettler vs. Ames Realty case declared the Doctrine of Prior Appropriation to be the valid Montana water right law. "Our conclusion," it said, "is that the common law doctrine of riparian rights has never prevailed in Montana since the enactment of the Bannack Statutes in 1865 and that it is unsuited to the conditions here. . . ."

The appropriation right which originated in California was used by the forty-niners to divert water from the streams to placer mine gold. They applied to the water the same rules that they applied to their mining claims—first in time, first in right and limitation of the right by beneficial use. Those who came to the Montana gulches brought with them these rules, applying them to agriculture as well as to mining.

The main points of consideration under the Doctrine of Prior Appropriation are:

1. The use of water may be acquired by both riparian and non-riparian landowners.

2. It allows diversion of water regardless of the reduction of the water supply in the stream.

3. The value of the right is determined by the priority of the appropriation; i.e., first in time is first in right.

4. The right is limited to the use of the water. Stream waters in Montana are the property of the State and the appropriator acquires only a right to their use. Moreover, this use must be beneficial.

5. A right to the use of water is considered property only in the sense that it can be bought or sold; its owner may not be deprived of it except by due process of law.

The State Legislature has provided methods for the acquisition, determination of priority and administration of the right. No right may be acquired on a stream without diversion of water and its application to a beneficial use. On unadjudicated streams, the Statutes stipulate that the diversion must be preceded by posting a notice at a point of intended diversion and by filing a copy of

it within 20 days in the county clerk's office of the county in which the appropriation is being made. Construction of the means of diversion must begin within 40 days of the posting and continue with reasonable diligence to completion. However, the Montana Supreme Court has ruled that an appropriator who fails to comply with the Statutes may still acquire a right merely by digging a ditch and putting the water to beneficial use.

To obtain a water right on an adjudicated stream one must petition the District Court having jurisdiction over the stream for permission to make an appropriation. If the other appropriators do not object, the court gives its consent and issues a supplementary decree granting the right subject to the rights of the prior appropriators.

Inasmuch as the Montana laws do not require water users to file official records of the completion of their appropriations, it becomes advisable as soon as the demand for the waters of a stream becomes greater than its supply, to determine the rights and priorities of each user by means of an adjudication or water right suit. This action may be initiated by one or more of the appropriators who may make all the other claimants parties to the suit. Thereupon the Judge of the District Court examines the claims of all the claimants and issues a decree establishing priority of the right of each water user and the amount of water he is entitled to use. The court decree becomes in effect the deed of the appropriator to his water right.

Whenever scarcity of water in an adjudicated stream requires an allocation of the supply according to the priority of rights, the Judge, upon petition of the owners of at least 15 percent of the water rights affected, must appoint a water commissioner to distribute the water. Chapter No. 231, Montana Session Laws 1963, Senate Bill 55 amended Section 89-1001 R.C.M. 1947, to provide that a water commissioner be appointed to distribute decreed water rights by application of fifteen percent (15%) of the owners of the water rights affected, or, under certain circumstances at the discretion of the Judge of the District Court—**"provided that when petitioners make proper showing they are not able to obtain the application of the owners of at least fifteen percent (15%) of the water rights affected, and they are unable to obtain the water to which they are entitled, the Judge of the District Court having jurisdiction may, in his discretion, appoint a water commissioner."** After the Commissioner has been appointed the Judge gives him instructions on how the water is to be apportioned and distributed in accordance with the full terms of the decree.

The recording of appropriations in local courthouses provides an incomplete record of the water rights on unadjudicated streams. In fact, the county records often bear little relation to the existing situation. Since the law places no restriction on the number or extent of the filings which may be made on an unadjudicated stream, the total amount of water claimed is frequently many times the available flow. There are numerous examples of streams becoming over appropriated. Once, six appropriators each claimed all the water in Lyman Creek near Bozeman. Before the adjudication of claims to the waters of Prickly Pear Creek, 68 parties claimed thirty times its average flow of about 50 cfs. Today, the Big Hole River with an average flow of about 1,000 cfs. has filings totaling 173,912 cfs. A person is unable to distinguish in the county courthouses the perfected rights from the unperfected ones since the law requires no official recordation of the completion of an appropriation. Recognition by the courts of unrecorded appropriations adds to the incompleteness of these records. To further complicate the situation, appropriators have used different names for the same stream in their filings. In Montana many of the streams flow through several counties; consequently water right filings on these inter-county streams are found distributed in two or more

county courthouses. Anyone desirous of determining appropriations on a certain river or creek finds it difficult and expensive to examine records in several places. In addition, the records are sometimes scattered because the original nine counties of 1865 have now increased to 56. As the original counties have been divided and subdivided, the water right filings have frequently not been transcribed from the records of one county to the other. Thus, a record of an early appropriation in what is at present Powell County may be found in the courthouse of the original Deer Lodge County.

It can readily be seen that this system of recording offers little protection to rights in the use of water until they are determined by an adjudication. In other words, an appropriator does not gain clear title to his water right until after adjudication and then the title may not be clear because the Montana system of determining rights is also faulty. In the first place, adjudications are costly, sometimes very costly when they are prolonged for years. It is estimated the litigation over the Beaverhead River, which has lasted more than twenty years, has cost the residents of the valley nearly one-half million dollars. In the second place, unless the court seeks the advice of a competent irrigation engineer, the adjudication may be based upon inaccurate evidence. In the third place, if some claimant has been inadvertently left out of the action, the decree is not final and may be reopened for consideration by the aggreived party. Another difficulty arises in determining the ownership of a water right when land under an adjudicated stream becomes subdivided in later years and the water is not apportioned to the land by deed or otherwise. There is no provision made by law requiring the recording of specific water ownership on deeds and abstracts.

The Legislative Session of 1957 passed Chapter 114 providing for the policing of water released from storage to be transmitted through a natural stream bed to the place of use. The owner of the storage must petition the court for the right to have the water policed from the storage reservoir to his place of use. If there are no objections, the court may issue the right and appoint a water commissioner to distribute the water in accordance therewith. This law applies only to unadjudicated streams.

Administration of water on adjudicated streams is done by the District Court, but it has its drawbacks. The appointment of a water commissioner is often delayed until the shortage of water is acute and the court frequently finds it difficult to obtain a competent man for a position so temporary. The present administration of adjudicated streams which cross the county boundaries of judicial districts creates problems. Many of the water decrees stipulate head gates and measuring devices for proper water distribution, but in many instances the stipulation is not enforced, causing disagreement among water users.

Since a water right is considered property and may be bought and sold, the nature of water requires certain limitations in its use. One of the major faults affecting a stream after an adjudication is the failure of the District Court to have some definite control over the transfer of water rights from their designated places of use. The sale and leasing of water is becoming a common practice on many adjudicated streams and has created serious complications. By changing the water use to a different location, many of the remaining rights along the stream are disrupted, resulting in a complete breakdown of the purpose intended by the adjudication. To correct this situation, legal action must be initiated by the injured parties as it is their responsibility and not the Court's.

At one time or another all of the Western Reclamation States have used similar methods of local regulation of water rights. Now all of them except Montana have more or less abandoned these prac-

tices and replaced them by a system of centralized state control such as the one adopted by the State of Wyoming. The key characteristics of the Wyoming system are the registration of both the initiation and completion of an appropriation in the State Engineer's Office, the determination of rights and administration by a State Board of Control headed by the State Engineer. These methods give the Wyoming water users titles to the use of water as definite and defensible as those which they have to their land.

When Montana began to negotiate the Yellowstone River Compact with Wyoming and North Dakota in 1939, the need for some definite information concerning our water and its use became apparent. The Legislature in 1939 passed a bill (Ch. 185) authorizing the collection of data pertaining to our uses of water and it is under this authority that the Water Resources Survey is being carried on. The purpose of this survey is six fold: (1) to catalogue by counties in the office of the State Engineer, all recorded, appropriated, and decreed water rights including the use rights as they are found; (2) to map the lands upon which the water is being used; (3) to provide the public with pertinent water right information on any stream, thereby assisting in any transaction where water is involved; (4) to help State and Federal agencies in pertinent matters; (5) to eliminate unnecessary court action in water right disputes; (6) and to have a complete inventory of our perfected water rights in case we need to defend these rights against the encroachments of lower states, or Wyoming or Canada.

GROUND WATER

Ground water and surface water are often intimately related. In fact, it is difficult in some cases to consider one without the other. In times of heavy precipitation and surface runoff, water seeps below the land surface to recharge underground reservoirs which, in turn, discharge ground water to streams and maintains their flow during dry periods. The amount of water stored underground is far greater than the amount of surface water in Montana, and, without seepage from underground sources, it is probable that nearly all streams in the state would cease to flow during dry periods.

It is believed that Montana's ground-water resources are vast and only partly developed. Yet this resource is now undergoing an accelerated development as the need for its use increases and economical energy for pumping becomes available. Continued rapid development without some regulation of its use would cause a depletion of ground water in areas where the recharge is less than the withdrawal. Experience in other states has shown that once overuse of ground water in a specific area has started, it is nearly impossible to stop, and may result in painful economic readjustments for the inhabitants of the area concerned.

Practical steps aimed at conserving ground-water resources as well as correcting related deficiencies in surface water laws became necessary in Montana. Prior to the Legislative Session of 1961, there was no legal method of appropriating ground water. Proposed ground-water codes were introduced and rejected by four sessions of the Montana Legislative Assembly in 1951, 1953, 1955, and 1959.

In 1961, during the 37th Legislative Session, a bill was introduced and passed which created a Ground-Water Code in Montana. (Chapter 237, Revised Codes of Montana, 1961.) This bill became effective as a law on January 1, 1962, with the State Engineer of Montana designated as "Administrator" to carry out provisions of the Act.

Some of the important provisions contained in Montana's New Ground-Water Law are:

Section 1. DEFINITIONS OR REGULATIONS AS USED IN THE ACT.

(a) "Ground-Water" means any fresh water under the surface of the land including the water under the bed of any stream, lake, reservoir, or other body of surface water. Fresh water shall be deemed to be the water fit for domestic, livestock, or agricultural use. The Administrator, after a notice of hearing, is authorized to fix definite standards for determining fresh water in any controlled ground-water area or sub-area of the State.

(b) "Aquifer" means any underground geological structure or formation which is capable of yielding water or is capable of recharge.

(c) "Well" means any artificial opening or excavation in the ground, however made, by which ground water can be obtained or through which it flows under natural pressures or is artificially withdrawn.

(d) "Beneficial use" means any economically or socially justifiable withdrawal or utilizations of water.

(e) "Person" means any natural person, association, partnership, corporation, municipality, irrigation district, the State of Montana, or any political sub-division or agency thereof, and the United States or any agency thereof.

(f) "Administrator" means State Engineer of the State of Montana.

(g) "Ground-Water area" means an area which as nearly as known facts permit, may be designated so as to enclose a single distinct body of ground water, which shall be described horizontally by surface description in all cases and which may be limited vertically by describing known geological formations, should conditions dictate this to be desirable. For purpose of administration, large ground-water areas may be divided into convenient administrative units known as "sub-areas."

Secton 2. RIGHT TO USE. Rights to surface water where the date of appropriation precedes January 1, 1962, shall take priority over all prior or subsequent ground-water rights. The application of ground water to a beneficial use prior to January 1, 1962, is hereby recognized as a water right. Beneficial use shall be the extent and limit of the appropriative right. As to appropriations of ground water completed on and after January 1, 1962, any and all rights must be based upon the filing provisions hereinafter set forth, and as between all appropriators of surface or ground water on and after January 1, 1962, the first in time is first in right.

Any ground water put to beneficial use **after** January 1, 1962 **must** be filed upon in order to establish a water right thereto.

Montana's Ground Water Code originally provided for four different types of forms that could be filed.

Form No. 1 **"Notice of Appropriation of Ground Water"**—shall require answers to such ques-

tions as (1) the name and address of the appropriator; (2) the beneficial use for which the appropriation is made, including a description of the lands to be benefited if for irrigation; (3) the rate of use in gallons per minute of ground water claimed; (4) the annual period (inclusive dates) of intended use; (5) the probable or intended date of first beneficial use; (6) the probable or intended date of commencement and completion of the well or wells; (7) the location, type, size, and depth of the well or wells contemplated; (8) the probable or estimated depth of the water table or artesian aquifer; (9) the name, address, and license number of the driller engaged; and (10) such other similar information as may be useful in carrying out the policy of this Act. This form is optional, but it has an advantage in that after filing the Notice of Appropriation, a person has 90 days in which to commence actual excavation and diligently prosecute construction of the well. Otherwise, a failure to file the Notice of Appropriation deprives the appropriator of his right to relate the date of the appropriation back upon filing the Notice of Completion. (Form No. 2).

Form No. 2 **"Notice of Completion of Ground Water by Means of Well"**—this form shall require answers to the same sort of questions as required by Form No. 1 (Notice of Appropriation of Ground Water), except that for the most part it shall inquire into accomplished facts concerning the well or means of withdrawal, including (a) information as to the static level of water in the casing or the shut-in pressure if the well flows naturally; (b) the capacity of the well in gallons per minute by pumping or natural flow; (c) the approximate drawdown or pumping level of the well; (d) the approximate surface elevation at the well head; (e) the casing record of the well; (f) the drilling log showing the character and thickness of all formations penetrated; (g) the depth to which the well is drilled; and similar information.

It shall be the responsibility of the driller of each well to fill out the Form No. 2, "Notice of Completion of Ground Water by Means of a Well," for the appropriator, and the latter shall be responsible for its filing.

Form No. 3 **"Notice of Completion of Ground Water Appropriation Without a Well"**—is for the benefit of persons obtaining (or desiring to obtain) ground water without a well, such as by sub-irrigation or other natural processes so as to enable such persons to describe the means of using ground water; to estimate the amount of water so used; and requiring such other information pertinent to this particular type of ground water use.

Form No. 4 **"Declaration of Vested Ground Water Rights"**—shall be used by persons who have put ground water to a beneficial use (including sub-irrigation or other natural processes), prior to January 1, 1962. The appropriator must within four (4) years after January 1, 1962 (the original law called for two years but the 1965 Legislature extended the time to four years after January 1, 1962) file a declaration in the office of the county clerk of the county in which the claimed right is situated and the declaration shall contain the following information: (1) Name and address of the claimant; (2) the beneficial use on which the claim is based; (3) the date or approximate date of the earliest beneficial use, and how continuous the use has been; (4) the amount of ground water claimed; (5) if the beneficial use has been for irrigation, the acreage and description of lands to which such water has been applied and the name of the owner thereof; (6) the means of withdrawing such water from the ground and the location of each well or other means of withdrawal; (7) the date of commencement and completion of the construction of the well, wells or other works for withdrawal of ground water; (8) the depth of the water table; (9) so far as it may be available, the type, size and depth of each well or the general specifications of any other works for the withdrawal of ground

water; (10) the estimated amount of ground water withdrawn each year; (11) the log of the formations encountered in the drilling of each well; and (12) such other information of similar nature as may be useful in carrying out the policy of the Act.

Failure to file Form No. 4 "Declaration of Vested Ground Water Rights" within the four-year period does not cause a forfeiture of a claimant's vested ground-water rights although he might be called upon at some future time to prove his rights in court. A valid filing of Form No. 4, however, will be accepted by the courts as prima facie evidence of a ground-water right.

It shall be recognized that all persons who have filed a Water Well Log Form as provided for under Section 1 and 2 of Chapter 58, Session Laws of Montana, 1957, shall be considered as having complied with the requirements of this Act.

It is important to note that the ground-water law states, "UNTIL A NOTICE OF COMPLETION (Form No. 2 or No. 3) IS FILED WITH RESPECT TO **ANY** USE OF GROUND WATER INSTITUTED **AFTER** JANUARY 1, 1962, **NO** RIGHT TO THAT USE OF WATER SHALL BE RECOGNIZED."

Copies of the forms used in filing on ground water are available in the County Clerk and Recorder's office in each of Montana's 56 counties. It shall be the duty of the County Clerk in every instance to file the original copy for the county records; transmit the second copy to the Administrator (State Engineer); the third copy to the Montana Bureau of Mines and Geology; and the fourth copy to be retained by the appropriator (person making the filing).

Accurate records and the amount of water available for future use are essential in the administration and investigation of water resources. In areas where the water supply becomes critical, the ground-water law provides that the administrator may define the boundaries of the aquifer and employ inspectors to enforce rules and regulations regarding withdrawals for the purpose of safeguarding the water supply and the appropriators (see the wording of the law for establishing a "controlled area").

The filing of water right records in a central office under control of a responsible State agency, provides the only efficient means for the orderly development and preservation of our water supplies and it protects all of Montana's use – on both ground and surface water.

METHOD OF SURVEY

Water resources data contained in Part I and Part II of this report are obtained from courthouse records in conjunction with individual contacts with landowners. A survey of this type involves extensive detailed work in both the office and field to compile a comprehensive inventory of water rights as they apply to land and other uses.

The material of foremost importance used in conducting the survey is taken from the files of the county courthouse and the data required includes: landownership, water right records (decrees and appropriations), articles of incorporation of ditch companies and any other legal papers in regard to the distribution and use of water. Deed records of landownership are reviewed and abstracts are checked for water right information when available.

Aerial photography is used by the survey to assure accuracy in mapping the land areas of water use and all the other detailed information which appears on the final colored township maps in Part II. Section and township locations are determined by the photogrammetric system, based on government land office survey plats, plane-table surveys, county maps and by "on the spot" location during the field survey. Noted on the photographs are the location of each irrigation system, with the irrigated and irrigable land areas defined. All the information compiled on the aerial photo is transferred and drawn onto a final base map by means of aerial projection. From the base map color separation maps are made and may include three to ten overlay separation plates, depending on the number of irrigation systems within the township.

Field forms are prepared for each landowner showing the name of the owner and operator, photo index number, a plat defining the ownership boundary, type of irrigation system, source of water supply and the total acreage irrigated and irrigable under each. All of the appropriated and decreed water rights that apply to each ownership are listed on the field forms with the description of intended place of use. During the field survey, all water rights listed on the field form are verified with the landowner. Whenever any doubt or complication exists in the use of a water right, deed records of the land are checked to determine the absolute right and use.

So far as known, this is the first survey of its kind ever attempted in the United States. The value of the work has become well substantiated in the counties completed to date by giving Montana its first accurate and verified information concerning its water rights and their use. New development of land for irrigation purposes by State and Federal agencies is not within the scope of this report. The facts presented are as found at the time of completion of each survey and provide the items and figures from which a detailed analysis of water and land use can be made.

The historical data contained in these reports can never become obsolete. If new information is added from time to time as new developments occur, the records can always be kept current and up-to-date.

Complete data obtained from this survey cannot be included in this report as it would make the text too voluminous. However, if one should desire detailed information about any particular water right, lands irrigated, or the number and amount of water rights diverted from any particular stream, such information may be obtained by writing the State Engineer's Office in Helena.

Every effort is being made to produce accuracy of the data collected rather than to speed up the work which might invite errors.

WATER RESOURCES SURVEY

Flathead County, Montana

PART I

History of Land and Water Use
On Irrigated Areas

Published By
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June, 1965

HISTORY AND ORGANIZATION

There was a legend among the Indians of the Flathead Country that they originally came from the Far North, and wandered southward in search of a better place to live until they came to the Flathead. The Flathead region pleased them so well that they made it their permanent home. In 1805, Lewis and Clark first came in contact with the Flathead Indians when they passed through the Bitterroot Valley of western Montana on their way to the Pacific Coast. Lewis and Clark called the Indians Cotlashoots, who were properly known as Salish, and who most white men called "Flatheads." However, they never practiced the flattening of the skull which was popular among some of the Pacific Coast tribes. The Flathead-Salish Indians of western Montana were called "Flatheads," in translation of their tribal sign which meant natural head and signifying that there was no implication of forehead mutilation.

The Flathead Indians are classified as being one of the tribal groups belonging to the Interior Salish Tribal Nation. The most important of these tribes were the Colville, Spokane, Kalispel, Flathead, Columbia, and Coeur d'Alene. The town of Kalispell derived its name from the Kalispel Indians who are also known as the Pend d'Oreille Tribe.

David Thompson, early day explorer and geographer, was probably the first white man to view the Flathead Valley, coming into the area in 1809. In 1842, Angus McDonald, a trader with the Hudson Bay Company, built the first cabin in the valley and established a trading post at the head of Flathead Lake, 7 miles southeast of the present town of Kalispell. A few years later this post was abandoned.

Actual settlement in the Flathead Valley came comparatively late. In 1847, Angus McDonald established a second Hudson Bay Company Post on Post Creek (Ft. Connah) south of Flathead Lake (now in Lake County), and his son Duncan, born there in 1849, was the first white child in this area.

The first settlement in the upper Flathead Valley was made by Joe Ashley, a trader under Angus McDonald, near the foothills south of the creek and lake which now bears his name. Ashley, seeing no future in the valley, sold his claim for $10.00 and moved out. Jack Fisher was perhaps the first white man to settle permanently in the Flathead Country in the year 1860. Farming in the upper Flathead Valley was first tried by Frank Greville who farmed by dry land methods. Next came Nicholas P. Moon who had profited from an earlier farming experience in California. Moon took out a water right and became the Flathead Valley's first irrigation farmer. By 1880 there were twelve men in the valley with intentions of settling there permanently. The following year John G. Dooley established the first post office at "Dooley's Landing" on the Flathead River.

Most of the early settlers coming into the valley drove their wagon trains overland from Missoula, and later from Ravalli, after the building of the Northern Pacific Railway through there in 1883. The roads they traveled were nothing better than trails and the trip around the west side of Flathead Lake was extremely difficult. After traveling through this rough country and arriving in the valley proper the new settlers still had to cross the Flathead River to locate on the better land.

Usually the crossing was made by boat or by crude ferries and frequently supplies, household goods, and livestock were lost. George Larkin, a trapper from Oregon, built the first ferry at Holt, near the head of Flathead Lake, which he operated successfully for several years.

Navigation by boat on the Flathead Lake and River began in 1884, thereby making the trip into the valley relatively easy and adding another chapter into the annals of the Flathead Valley history. The 65 miles from the foot of Flathead Lake to the end of navigation on the river was first attempted by the sailboat "Swan," but this sailboat proved to be so impractical that a steam engine and propeller was installed and its name changed to the "U. S. Grant." The U. S. Grant made semi-weekly round trips from the landing where Polson now stands to other points on the river where boat landings were established. Notable among the landing places built and used by boats during this period of navigation were Holt, Selish (where John Dooley had established a post office), Egan and Greggs Landing, afterward known as Demersville. As the demand for boat service increased, boats built on various dates and placed in operation were: the "Pocahontas," "Tom Carter," "Crescent," "State of Montana," "Maryann," "Montana," "The Flyer," "City of Polson" and the "Star." With the coming of the Great Northern Railway in 1891 some of the steamboat traffic declined, but due to the poor roads in the upper part of the valley the career of steamboats did not end until after the turn of the century.

During the latter half of the 1880's the Flathead Valley began to boom with a marked increase in population and industrial activity. Roads were constructed, lumber mills built, and the rich soil of the farm lands grew highly productive crops. Ashley, one-half mile west of Kalispell, was the first town in the valley and was chosen as the most likely place to build a main business center of the Flathead Valley. In 1882 the first business places were opened in Ashley and for a few years the town grew and seemed destined to be the focal point of the valley. However, with the advent of the steamboat and the railroad, Ashley fell behind, with hardly a trace of the townsite left today.

Kalispell actually started with the town of Demersville, which was also known as Greggs Landing, Greggsville and Scooptown. This town was located a few miles east and south of Kalispell. Demersville was named for "Telesphore J. Demers," a cattleman, merchant and freighter. He bought 80 acres of land, laid out the townsite and started a mercantile business which he operated successfully for a few years. In the fall of 1890, word was received that the Great Northern Railway had crossed the mountains and was coming down the middle fork of the Flathead River. Charles E. Conrad and A. A. White located the new town of Kalispell for the Great Northern Railway 3 miles northwest of Demersville and many thought the new town would be as large as St. Paul, Minnesota. Demersville was moved over the prairie to the new railroad town and today there is nothing left of it except one or two old buildings.

Flathead County was created out of Missoula County on February 6, 1893, with Kalispell chosen as the county seat and incorporated as a city. Kalispell continued to increase in size and population until 1902 when the railroad (to avoid a long uphill freight haul) moved its division point 14 miles north to Whitefish, a small town on Whitefish Lake. Kalispell and the surrounding area suffered a temporary set-back by the move but soon recovered to become one of the leading cities in Montana.

Water is the basic resource of any land and the Flathead area is rich in water resources. It has, in addition to Flathead Lake, the Swan, Flathead, Whitefish and Stillwater Rivers which provide an abundance of water for irrigation, industrial and domestic use.

Agriculture, with the growing use of irrigation and other modern farming techniques, is one of the main industries in Flathead County. Well kept productive farm land covers much of the valley floor (see Crops & Livestock of this report), with thriving fruit orchards, namely cherries and apples, grown along the east shore of Flathead Lake. The Flathead seed potatoes are among the world's finest and it is said that Idaho's famous potatoes came from the Flathead seed.

Lumbering ranks high in the industrial activity of the diversified economy in Flathead County. In 1956, the Flathead National Forest Headquarters reported sales to private loggers in excess of $1,000,000 and estimated the overall lumber value at $16,000,000. The lumber industry provides employment for thousands of valley residents and annually ranks among the top three industries in the county and in the state.

Last, but not least, of the industries in Flathead County is the Anaconda Aluminum Company reduction works at Columbia Falls, completed in 1956 at a cost of $60,000,000. This plant provides year-round employment for 600 valley residents and produces 60,000 tons of aluminum annually. The Flathead Valley was chosen as the site of the Anaconda Company's initial venture into the aluminum field, utilizing hydroelectric power from Hungry Horse Dam.

Hungry Horse Dam, built in 1953, on the south fork of the Flathead River, is the world's fourth highest and third largest dam. The huge concrete structure, located 20 miles northeast of Kalispell, reaches a height of 564 feet above bed rock and has a crest length of 2,115 feet. It impounds 3,500,000 acre-feet of water and forms a lake 34 miles long and 3½ miles wide at its widest part. The estimated cost of this hydroelectric project was approximately $108,000,000.

Glacier National Park is located 32 miles northeast of Kalispell on Federal Highway 2 and attracts thousands of visitors into Flathead County each year. It contains an area of nearly 1,583 square miles of which approximately two-thirds lies in Flathead County. Glacier National Park has some of the most spectacular scenery and primitive wilderness in the entire Rocky Mountain region. The famous "Going-To-The-Sun" highway carries the tourists along the nation's most scenic route, over the "Alps of America." Accommodations inside the park range from fine hotels to mountain chalets, cabin camps, trailer parks and public camp grounds.

The northern part of Flathead Lake which extends into Flathead County is located in the heart of Montana's vacationland. The lake is 38 miles long and 15 miles wide and is surrounded by 104 miles of hard surfaced highway. Flathead Lake, one of America's most beautiful lakes, is the largest body of fresh water west of the Mississippi River and covers 120,000 surface acres with crystal clear water. Vacationers have for their enjoyment boating, water skiing, swimming and fishing, combined with excellent over-night accommodations along its shores.

The Big Mountain ski resort near Whitefish and 24 miles north of Kalispell offers the skiing enthusiasts one of the nation's finest ski resorts, with lodging accommodations, excellent food, a well equipped ski shop and challenging ski runs.

Transportation facilities in Flathead County include the Great Northern Railroad, Federal Highways 2 and 93, State Highways 35, 40, 206, 208, 326 and 424 and numerous improved county roads. The most important towns in the county and their population are: Kalispell 10,500, Whitefish 3,000, Columbia Falls 2,100, Somers 700 and Big Fork 500. Other smaller communities are Lakeside, Hun-

gry Horse, Martin City, Coram, West Glacier, Creston, Olney, Marion, Kila and Essex. In 1960, Flathead County's total population was listed as 32,965 people.

CLIMATE

Flathead County, with its eastern boundary coinciding with the Continental Divide, is one of Montana's largest counties, with topography ranging from extremely mountainous in its eastern and northern sections to only moderately mountainous in the southwest. Many large lakes dot the county, and several deep river valleys cut through the mountains in a very complex drainage system. As in any mountainous area these (and other) geographical features help to produce wide variations in climate – extremely wide between the actual slopes of the Continental Divide and the broad valleys north of Flathead Lake to the Whitefish-Columbia Falls area. Except for the higher mountain ridges and the cultivated or populated valley bottoms, the county is heavily forested, reflecting a climate very favorable for vegetative growth.

The larger valleys are those of the South Fork of the Flathead (flowing generally northward into Hungry Horse Reservoir), the Middle Fork of the Flathead (flowing generally northwestward between the Flathead Range and the Continental Divide), the North Fork of the Flathead (flowing generally southward to join the Middle Fork just upstream from Hungry Horse), the Stillwater River (running southeastward through the Kalispell area), and the Flathead River itself from Columbia Falls to Flathead Lake. In addition, there are numerous tributaries of some importance (Spotted Bear River, Bear Creek, etc.), but the Flathead River complex is primary in its effects on climate. County elevations range from over 10,000 feet on a few peaks in Glacier National Park to about 2,900 feet along the shore of Flathead Lake.

County climate in general may be classed as a modified Pacific maritime type, but on a couple of occasions in most winters polar continental air may spill westward over the Continental Divide, bringing brief periods of Continental type winter weather. While running a little cooler and not so wet as Pacific Coast climates, the modifications are not very large, and the coastal tendency for dry summers and warm summertime days (except along the immediate coast line) reaches as far as Flathead County much of the "warm" season in most years. Annual average temperatures range from 35.8° at Summit (Marias Pass) to 44.2° in downtown Kalispell (see temperature table), and average temperatures roughly run 3° or 4° warmer in the southern part of the county than in the north at the same elevation. For its latitude (about 47° 36′ to 49°), winters are not very cold, averaging around 20° in January in most of the county, and 15.4° even at Summit. Summers are pleasantly warm – see July averages in the table.

Growing season (number of days between last spring and first fall 32° occurrences) varies considerably throughout the county. At the Kalispell Airport this season averages 135 days (4½ months), but at the mountain location of Summit it is only 17 days, and at Polebridge on the North Fork of the Flathead and at Pleasant Valley it is 30 days. At West Glacier it is 90 days, and it is estimated that 100-day or more seasons may be found only in the lower elevations around Flathead Lake and north through the Kalispell vicinity to the Columbia Falls-Whitefish area.

Precipitation averages heavier over much of the county than in most of Montana. A 12-year average at Essex indicates nearly 40 inches a year, but mountain slopes – particularly of the Continental Divide – are undoubtedly wetter. Records indicate that the old Post Office weather station

in downtown Kalispell may be the driest point in the county, averaging 14.73 inches. The seasonal distribution of precipitation is different over most of the county from almost all of Montana to the south and east. The pronounced early summer rainfall maximum common to most of Montana is not found here; the variation from month to month is relatively small, the driest months are July and August, and mid-winter precipitation is substantial—particularly in the mountains where winter and early spring snowfall usually is heavy. Snowfall of several hundred inches a year is common in the county's northern and eastern mountains. This mountain snowfall contributes heavily to the pronounced spring - early summer runoff maximum observed in all mountain source streams during May and June every year.

Winters are cloudy much of the time; Kalispell, the only point in the county for which long records of cloudiness are on file, shows 8.6 sky cover on a 0-10 scale in January (10 meaning overcast sky) and most other sections of the county probably have even more sky cover than Kalispell. In a normal January, the sun shines only 28 percent of the time. On the other end of the scale, summers in Flathead County have a lot of sunny weather. At Kalispell the sun shines 77 percent of the time in July, and cloud cover averages only 3.6 on the 10 scale. Relative humidity in mid-afternoon averages, in January, about 85 percent in most of the county. But in July mid-afternoon is often dry—averaging around 30 percent in most years. Oppressive combinations of heat and humidity are unknown. In an average year Kalispell will have 19 days of 90° maximum or warmer, 53 days maximum 32° or colder, 190 days minimum 32° or lower, and only 18 days 0° minimum or colder. Maximums of 100° occur only rarely—about once in 10 years in Kalispell, less often than that elsewhere.

Really severe storms are not common in Flathead County, particularly if one recognizes that heavy snows are a yearly part of the mountain climate complex. Thunderstorms usually are less energetic here than east of the Continental Divide, but once in a while one will produce enough hail to cause some crop damage. They also are less frequent than in other parts of the state. Possibly the greatest problem is caused by the infrequent occurrence of a heavy windstorm, possibly on the order of once in 5 to 10 years, which can blow down timber in large quantities, damage power and telephone lines, etc. Even with the low frequency of occurrence, usually only small areas are affected, and in any one locality they must be considered rare. The northeast wind accompanying about two or three cold waves a year sometimes can be troublesome as it blows out of Bad Rock Canyon onto the Columbia Falls-Kalispell plain. Sometimes reaching speeds of more than 60 m.p.h. with temperatures falling from above freezing to near or below zero and with blowing snow, these cold wave winds warrant careful handling. But the wind force decreases with distance from the canyon in most cases, and only rarely does a cold wave wind achieve gale strength over a large part of the county.

Selected temperature and precipitation data for Flathead County appears in the following condensed tables:

TEMPERATURE

Station	Years of Record	Highest of Record-Date	Lowest of Record Date	Average Jan.	Average July	Average Annual
Creston	1949-1963	100-8/4/61	–40-1/30/50	20.6	64.2	43.2
Hungry Horse Dam	1948-1963	102-7/19/60	–40-1/30/50	19.5	64.8	42.5
Kalispell (City)	1949-1963	101-8/5/61**	–28-1/31/50	19.1	65.7	44.2
Kalispell (WBO)	1899-1948	101-7/28/34	–34-1/11/09	21.8	65.6	43.3
Kalispell (WBAS)	1949-1963	105-8/4/61	–38-1/31/50	21.1	65.5	43.2
Pleasant Valley '	1923-1963	102-8/4/61	–51-12/18/24	19.5*	60.1*	40.1*
Polebridge	1933-1963	101-7/19/36**	–46-1/25/57**	16.5	61.2	39.2
Summit	1935-1963	96-8/4/61	–55-1/3/59	15.4	57.0	35.8
West Glacier	1914-1963	101-7/28/34	–42-12/18/24	21.1*	64.0*	42.1*

*1931-1960

**Also on earlier dates, months, or years.

PRECIPITATION

Station	Years of Record	Yearly Average	Growing Season Average	Percent Falling in Growing Season	Wettest Amt.	Wettest Year	Driest Amt.	Driest Year
Creston	1949-63	18.55	9.92	53	26.52	1951	11.43	1952
Essex	1951-63	39.21	14.41	37	47.87	1953	27.58	1952
Hungry Horse Dam	1948-63	31.30	13.20	42	40.99	1959	16.72	1952
Kalispell (City)	1949-63	15.17	8.01	53	20.29	1959	8.79	1952
Kalispell (WBO)	1899-48	14.73	7.82	53	20.91	1948	10.39	1929
Kalispell (WBAS)	1949-63	15.04	7.97	53	21.87	1951	11.15	1952
Pleasant Valley	1908-63	18.84*	7.99*	42	29.18	1933	10.39	1931
Pleasant Valley (4SE)	1946-63	20.88	7.97	38	26.22	1948	9.67	1952
Polebridge	1933-63	22.42	9.18	41	33.21	1951	13.07	1952
Summit	1935-63	36.87	14.62	40	55.51	1953	25.30	1939
West Glacier	1914-63	28.06*	11.74*	42	38.97	1951	17.43	1935

*1931-1960

SOILS

Local rock formations furnish the material for soils found in a given locality. The physiography, drainage and glacial history of the area determined how these materials were deposited and, in fact, account for some of the differences we find in the soils. Soil depth, density, texture and acidity or alkalinity are directly related, within limits, to the material from which the soil was formed.

Most of Flathead County has been influenced by alpine glaciation. These areas are covered with material that was picked up, mixed and redeposited either by the ice or by water from the ice as it melted. The variations in soils we see today result from alterations of geologic material by **climate** and **living organisms**, especially vegetation. The length of **time** these forces have been active and the **topography** on which the action has taken place also contribute to these variations.

The Great Soil Groups most widely represented in Flathead County are Alluvial, Lithosol, Chestnut, Chernozem, Solodized-Solonetz, Gray Wooded and Brown Podzolic soils.

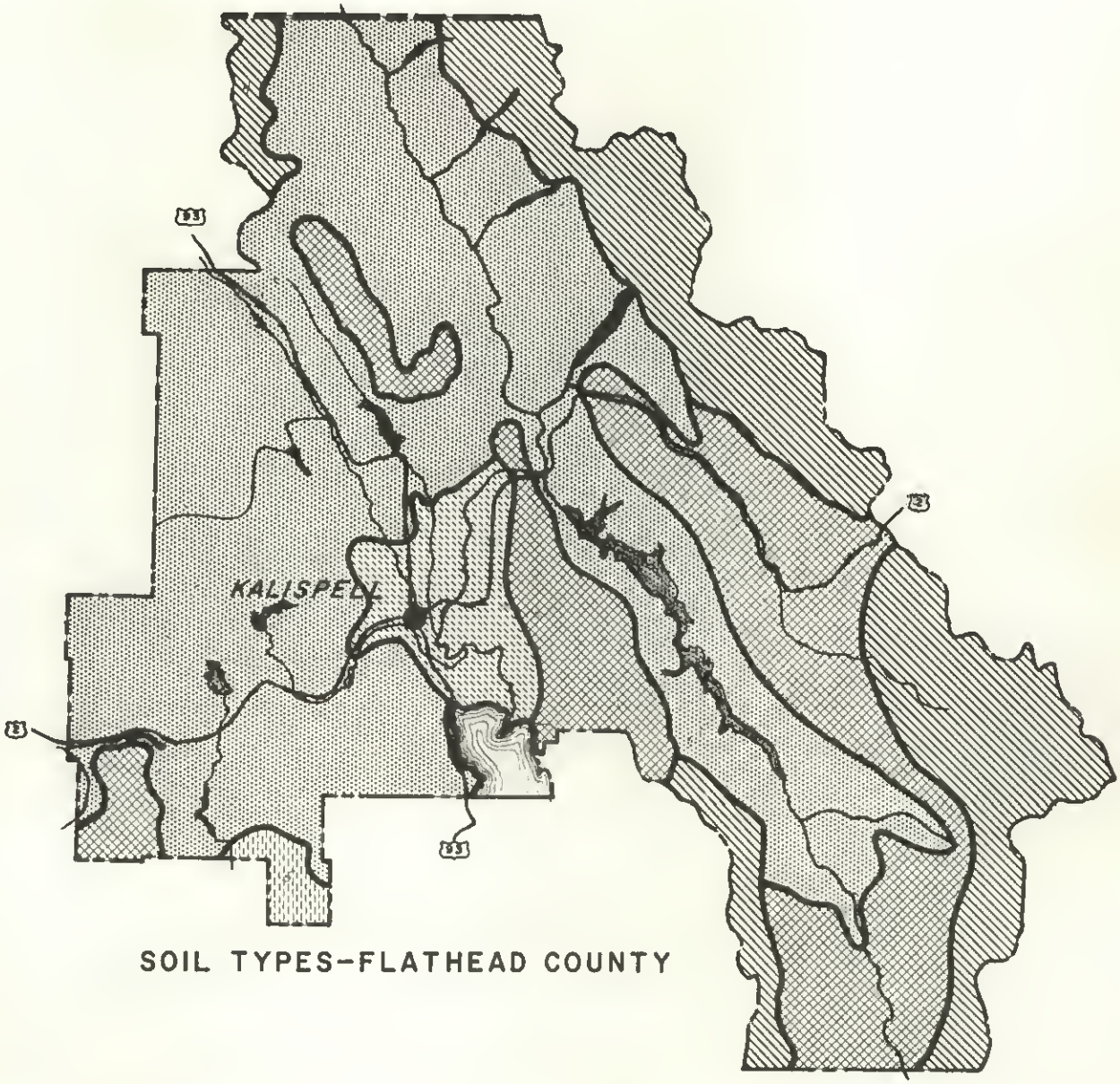
Alluvial soils (Entisols*) are young. They occur usually in small areas along streams and may be flooded periodically. The only development that has occurred in these soils is the darkening of the surface by an accumulation of organic matter. The material below the surface is essentially the same as it was at the time of deposition. These soils are used mainly for production of grain and hay, some of which is irrigated.

Lithosols (Entisols*) are soils developed in material that is less than 30 inches deep over bedrock. These are young soils without strongly contrasting horizons. Soil development has been confined largely to darkening of the surface by organic matter. These soils are used for grain and hay production and native range.

Chestnut and Chernozem soils (Mollisols*) have a dark surface soil, usually a clayey, prismatic subsoil and a lime accumulation at 20-25 inches below the surface. This lime horizon may extend to 50 inches. The Chernozem soils are developed under a higher precipitation (16-24") and have a darker surface than the Chestnut soils (10-16" precipitation). The depth to the lime accumulation may be somewhat greater in the Chernozem soils. These soils are used mainly for grain and hay production and some native range.

Solodized-Solonetz soils (Natrustolls*) generally occur in small areas in association with Chestnut soils. They are characterized by thin platy surface soils over dense hard clay-pan subsoils. The upper part of the subsoil often has a light-colored (bleached) zone 1-4 inches thick. The bleached zone should not be confused with the lime zone which is usually found below the clay-pan subsoil. These soils often occur as "Slick spots", "Seab land" or "Micro pits". These show up under cultivation in all but the wettest years as spots — shorter plants surrounded by taller ones on the adjacent soils. Their use is generally the same as that of the associated Chestnut soils. Greasewood is often found on Solodized-Solonetz soils in their natural state.

Gray Wooded soils (Alfisols*) occur principally in the mountain regions. The mean annual precipitation varies from about 12-25 inches. The vegetation consists mainly of coniferous forests. A dark surface layer of less than 4 inches may be present just under the forest litter. In the absence of the dark layer, a light gray to white zone 4 to 12 inches thick lies just beneath the litter. The



SOIL TYPES–FLATHEAD COUNTY

Dominantly Chernozem and Chestnut soils with associated Solodized–Solonetz and Alluvial soils along streams.

Dominantly Gray Wooded soils.

Dominantly Brown Podzolic soils.

Steep mountainous land above 8500 feet.

Dominantly Lithosols and associated Solodized–Solonetz soils.

Note: Alluvial soils occur along most streams but in areas too small to show on the map.

subsoil—a mixture of surface soil and substratum—may extend to depths of 3-4 feet. The major clay accumulations lie below this zone of mixing and may extend to depths of 6 feet in extreme samples. These soils are used mainly for timber production and Christmas trees.

Brown Podzolic soils (Spodosols*) occur principally in the mountain regions. They are found under a mean annual precipitation of 25-50". The most striking feature of these soils is the brown or reddish-brown horizon just under the forest litter. This brown horizon may extend to a depth of 12 inches and is in striking contrast to the gray or nearly white horizon of the Gray Wooded soil. Timber production and Christmas trees are important uses of these soils.

For more detailed information on soils – See the Soil Survey Report of the Upper Flathead Valley, 1960. Available from the Information Office, Montana State College, Bozeman.

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*New names for some soils. Based on the new Soil Classification System, 1960—Soil Classification—A Comprehensive System. USDA, SCS.

CROPS AND LIVESTOCK

Flathead County encloses 3,113,281 acres of land. Ninety percent of the county is forested and mountainous. Glacier National Park contains 560,000 acres and the State and National Forests encompass 1,790,000 acres.

Most of the county's 1,100 farms are located in the Flathead Valley. This valley is about fifteen miles wide and twenty-five miles long with a gradual slope from north to south. The largest river is the Flathead which drains into Flathead Lake at the southern end of the valley. Other important rivers include the Swan, Stillwater, and Whitefish.

The farming area of Flathead County is confined to the floor of the Flathead Valley and relatively small benchland and foothill holdings. About 40 percent of the cropland lies in the first 107 feet of altitude above Flathead Lake, 47 percent in the next 500 feet, and only 13 percent above 3,500 feet in altitude. The highly productive valley area is fringed at east, west, and north by cutover or forest land. The type of land, and the timber cover which naturally grows on it, severely limits grazing opportunities.

Field crops, livestock, and dairy products are the principal products of Flathead farms. Cash products produced include beef cattle, wheat, barley, oats, peas, milk products, swine, potatoes, hay, sheep, poultry, miscellaneous livestock products, farm forest products including Christmas trees, cherries, other fruits, and miscellaneous horticultural specialties.

According to the 1964 Montana Agricultural Statistics report, farm sales for the year 1963 were $3,311,400 for livestock and livestock products. The sale of crops totaled $2,951,600.

While primarily a dry land farming area, irrigation use is steadily increasing. Sprinkler irrigation started in the county in 1947 and has grown steadily since that time. The 1964 Montana Agricultural Statistics report shows 22,046 acres devoted to irrigation. The value of crops produced on this irrigated land totals $1,153,600. The results is an average value of $52.00 per acre of production on the irrigated land in comparison to $40.00 per acre on the dryland where 71,557 acres produced $2,876,200 worth of farm products.

The climate, the availability of water for irrigation and soils that yield a tremendous response to management make it possible for Flathead farmers to diversify and shift production emphasis as economic conditions warrant.

Wheat and barley remain the primary crops in the better soils, such as Creston and the Lower Valley areas. Livestock and forage production are increasing steadily in all other areas of the county. Increased production is resulting from irrigation development, increased use of commercial fertilizer, animal manures, and other organic material. Additional acres are being diverted to livestock and forage production as a result of land clearing, drainage, and seeding of cropland to pasture and hay.

Expansion in cattle production is evidenced by three developments. First, over 10,000 head of cattle will be fed in the valley in 1965. There was almost no feeding just ten years ago. Second, a cattle slaughtering facility has been installed with a capacity of 600 head per week. Third, the feasibility of a livestock auction yard has been established and one will be installed in 1965. Continued growth in the valley's livestock production can be expected.

Sweet cherry growing is another expanding segment of the agricultural economy. Production of sweet cherries is particularly profitable adjacent to Flathead Lake because this area grows a large, firm premium cherry which is marketed after competition from other areas has ceased. Production is nearing four million pounds annually. This is double the production five years ago. Orchard land is still being developed.

The Flathead has many desirable natural conditions to enable dairying to remain a thriving business. Irrigation improved forage quality and more comfortable housing has enabled dairy producers to maintain a competitive position in the production of dairy products.

The breeding of registered livestock is an expanding industry in the county. Beef cattle breeds include Hereford, Aberdeen Angus, Shorthorns, and Charollais; sheep breeds include Targhees, Columbias, and Suffolks; swine breeds include Durocs and Chester Whites.

Although sheep production has remained fairly stable over a period of years, there is opportunity for expansion of farm flocks on many of the smaller farms.

Swine production has experienced a steady growth over the years. A further expansion is anticipated with increased feed production and improved and more efficient physical plants.

Potatoes furnish one of the best opportunities to use irrigation to advantage in the Flathead. Certified seed potatoes now grown in the area under sprinkler irrigation are fairly free of the virus diseases which cause concern in Idaho, Washington, and Oregon. Flathead seed potatoes have been finding a market in Idaho, California, and Washington.

There are a number of commercial truck gardens in the valley. The climate, soils, and availability of water along with a steady increase in population point to a greater intensification of vegetable, berry, and fruit gardens. A number of processing, manufacturing, and service activities can be expected to develop as the Flathead farm economy is intensified and diversified.

Listed below is a table showing the crops, their acreages, yields, and value, with a total of livestock and livestock products sold during the year:

CROP PRODUCTION, 1959, HARVESTED ACRES

Crops	Acres	Yield/Acre	Total Yield
Winter Wheat	20,457	34.4 Bu/A.	704,020 bushels
Spring Wheat	5,275	18.5 Bu/A.	97,360 bushels
Barley	15,229	32.9 Bu/A.	501,805 bushels
Oats	7,286	32.6 Bu/A.	237,280 bushels
Potatoes	750	138 cwt/A	103,553 cwt.
Alfalfa	18,347	2 T/A	36,862 tons
Mixed Hay	8,342	1.2 T/A.	9,857 tons
Wild Hay	4,258	1.2 T/A.	5,141 tons
Other Hay	2,119	2 T/A.	4,381 tons
Silage (green wt.)	427	5.7 T/A.	2,440 tons

LIVESTOCK AND LIVESTOCK PRODUCTS SOLD FROM FARMS, 1959

Product			Dollar Value Sales
Livestock and Livestock Products:			
Livestock sold alive	1,984,508		
Poultry and Poultry Products	209,308		
Dairy Products	1,092,734	Total	$3,286,050
Crops Sold:			
Field Crops	2,015,183		
Forest and Horticultural Products	413,024		
Vegetables and Fruits	58,579	Total	$2,486,786
All Farm Products Sold			$5,772,836

SNOW SURVEYS

The Soil Conservation Service, in cooperation with other federal, state and private agencies makes snow surveys throughout the winter and spring months to predict the streamflow. This information is used by farmers and ranchers to assess the amount of irrigation water that will be available, by irrigation and flood control organizations to manage reservoir operation, by power companies and many other groups and individuals whose operations are related to or dependent on streamflow. This foreknowledge allows water users and managers time to plan operations according to the expect-

ed runoff. Farmers and ranchers can plan crops for the coming year. Reservoirs can be operated for maximum efficiency by combining flood control with power generation and irrigation storage. Bankers, railroad managers, equipment builders and persons in various other businesses can determine and plan for the effect the anticipated water supply may have on their operation.

In Flathead County the operation of both Hungry Horse Reservoir and Flathead Lake is based on streamflow forecasts made from snow survey data.

A snow survey consists of measuring the depth and amount of water in the snow, or snow water equivalent. Measurements are taken at the same place each year, using standard snow sampling equipment. Almost all courses are measured near the first of March, April and May, with a few courses measured earlier and later in the season.

Snow courses in or immediately adjacent to Flathead County are shown in the following tabulation. Other snow courses used to forecast the Flathead River streamflow, but not in Flathead County, are shown in the reports for Lake, Missoula and Powell Counties.

SNOW COURSES AND SOIL MOISTURE STATIONS

Drainage and Name	Number	Elevation	Year Established	Dates Measured[1]*
North Fork Flathead River				
Grave Creek	14A11	4300	1965	3, 4, 5, 5½, 6
Kishenehn	14A06	3890	1954	3, 4
Murphy Lake R. S. Soil Moisture	14A10M	3000	1964	Monthly
Weasel Divide	14A07	5450	1955	3, 4, 5, 5½, 6
Middle Fork Flathead River				
Badger Pass	13A15	6900	1964	3, 4, 5
Beaver Lake	13A11	5900	1964	3, 4, 5
Freight Creek	12A01	6000	1948	3, 4, 5
Gunsight Lake	13B12	6300	1964	3, 4, 5
Marias Pass	13A05	5250	1934	1, 2, 3, 4, 5
Marias Pass Soil Moisture	13A05M	5250	1950	Monthly
Mineral Creek	13A16	4000	1957	3, 4, 5
Wrong Ridge	12B03	6800	1949	3, 4, 5
South Fork Flathead River				
Desert Mountain	13A02	5600	1937	1, 2, 3, 4, 5, 6
Desert Mountain Soil Moisture	13A02M	5600	1957	Monthly
Holbrook	13B13	4530	1951	1, 2, 3 ,4, 5
Spotted Bear Mountain	13B02	7000	1948	1, 2, 3, 4, 5
Strawberry Lake	13A10	5600	1948	3, 4, 5
Twin Creeks	13B11	3580	1951	1, 2 ,3, 4, 5
Swan River				
Camp Misery	13A17	6400	1962	3, 4, 5
Trinkus Lake	13B01	6100	1949	3, 4, 5
Whitefish River				
Hell Roaring Divide	14A03	5770	1942	1, 2, 3, 4, 5, 5½, 6
Stillwater River				
Brush Creek	14A04	5000	1937	3, 4, 5
Logan Creek	14A05	4300	1937	3, 4, 5
Little Bitterroot River				
Bassoo Peak	14B03	5150	1961	3, 4, 5
Griffin Creek Divide	14A09	5150	1960	3, 4, 5

Current information on snow surveys and streamflow forecasts can be obtained from the Soil Conservation Service, P .O. Box 855, Bozeman, Montana, or Soil Conservation Service, Kalispell, Mont.

*[1]Numerals 1, 2 ,3, 4, 5, 5½, 6 refer to January 1, February 1, March 1, April 1, May 1, May 15 and June 1 measurements.

STREAM GAGING STATIONS

The U. S. Geological Survey measures the flow of streams, co-operating with funds supplied by several state and federal agencies. The results have been published yearly in book form by drainage basins in Water-Supply Papers through the year 1960. Beginning with 1961, the streamflow records have been published annually by the U. S. Geological Survey for the entire state under the title, "Surface Water Records of Montana". Data for 1961-65 and subsequent five year periods will be published in Water-Supply Papers. Prior to general issuance, advance copies of station records may be obtained from the U. S. Geological Survey. That agency's records and reports have been used in the preparation of this resume'.

Data given below covers the stream gaging records which are available from Flathead County from the beginning of measurements through the water year 1963. The water year begins October 1 and ends September 30 of the following year.

Following are equivalents useful in converting from one unit of measurement to another:

(a) In Montana, one cubic foot per second equals 40 miner's inches.

(b) One acre-foot is the amount of water required to cover an acre one foot deep.

(c) One cubic foot per second will nearly equal two acre-feet (1.983) in 24 hours.

(d) A flow of 100 miner's inches will equal five acre-feet in 24 hours.

(e) One miner's inch flowing continuously for 30 days will cover one acre 1½ feet deep.

For reference purposes, the stream gaging stations are listed in downstream order.

Flathead River at Flathead, British Columbia*

The water-stage recorder is at the highway bridge, 0.2 miles north of the international boundary, 0.2 miles northwest of Flathead, British Columbia, and 7 miles northwest of Trail Creek, Montana. The drainage area is approximately 450 square miles. Records are available from March 1929 to date (1965) with no winter records prior to 1952. The maximum discharge was 16,300 cfs (June 8, 1964) and the minimum observed, 65 cfs (April 9, 1929). The average discharge for 12 years (1951-63) was 975 cfs or 705,900 acre-feet per year. The highest annual runoff since 1952 was 900,800 acre-feet (1954) and the lowest 556,000 acre-feet (1958). There are no diversions above the station. This is one of a number of stations which are maintained jointly by Canada and the United States.

Flathead River near Columbia Falls*

The water-stage recorder is 1½ miles downstream from Canyon Creek, 3¾ miles upstream from Middle Fork, and 9 miles northeast of Columbia Falls. The drainage area is 1,548 square miles. Records are available from September 1910 to September 1917 (no winter records in some years),

April 1929 to February 1935 (incomplete), June 1935 to date (1965). The maximum discharge was 69,100 cfs (June 9, 1964) and the minimum, 198 cfs (January 8, 1953). The average discharge for 32 years (1910-12, 1913-15, 1935-63) was 2,913 cfs or 2,109,000 acre-feet per year. The highest annual runoff was 3,002,000 acre-feet (1954) and the lowest 1,004,000 acre-feet (1944). There are a few small diversions from tributaries for irrigation of hay meadows above station.

Middle Fork Flathead River near Essex

The water-stage recorder was 1 mile downstream from Charlie Creek and 7½ miles southeast of Essex. The drainage area is 408 square miles. Records are available from April 1957 to September 1961 (no winter records after 1958). The maximum discharge during the period of record was 10,500 cfs (June 6, 1959) and the minimum daily determined, 85 cfs (January 1, 1958). The maximum discharge during the flood of June 8, 1964 was 57,900 cfs, from slope-area measurement of peak flow. There are no diversions above station.

Skyland Creek near Essex

The water-stage recorder was 150 feet upstream from mouth and 10 miles east of Essex. The drainage area is 8.09 square miles. Records are available from January 1946 to September 1952. Annual maximums for water years 1954, 1959 to date (1965). The maximum discharge during the period of continuous record was 284 cfs (May 22, 1948) and the minimum, 0.1 cfs (November 15, 1946). The maximum discharge during the flood of June 8, 1964 was 3,580 cfs, from slope-area measurement of peak flow. The average discharge for 6 years (1946-52) was 19.2 cfs or 13,900 acre-feet per year. The highest annual runoff was 18,140 acre-feet (1950) and the lowest, 9,440 acre-feet (1949). There are no diversions above station.

Bear Creek near Essex

The water-stage recorder was located 1 mile downstream from Autumn Creek and 8½ miles east of Essex. The drainage area is 20.7 square miles. Records are available from January 1946 to September 1952. The maximum discharge during the period of record was 696 cfs (May 22, 1948) and the minimum daily, 5.5 cfs (January 21 to March 4, March 8-16, 1949). The maximum discharge during the flood of June 8, 1964 was 8,380 cfs, from slope-area measurement of peak flow. The average discharge for 6 years (1946-52) was 46.0 cfs or 33,300 acre-feet per year. The highest annual runoff was 41,500 acre-feet (1951) and the lowest, 22,170 acre-feet (1949). There are a few small diversions above station.

Middle Fork Flathead River at Essex

The water-stage recorder was located at the highway bridge 0.6 miles upstream from Ole Creek, 0.7 miles southeast of Essex, and 4 miles downstream from Bear Creek. The drainage area is 510 square miles. Records are available from October 1939 to September 1953, June 1956 to September 1964. The maximum discharge was 75,300 cfs (June 8, 1964), from slope-area measurement of peak flow, and the minimum daily, 30 cfs (January 22, 1940). The average discharge for 21 years was 922 cfs or 766,700 acre-feet per year. The highest annual runoff was 1,142,000 acre-feet (1959) and the lowest 336,400 acre-feet (1941). There are no significant diversions above the station.

Middle Fork Flathead River at West Glacier (Belton)

The staff gage was located at West Glacier (Belton), half a mile upstream from highway bridge, and 2 miles upstream from outlet of Lake McDonald. The drainage area is 943 square miles. Records are available from October 1911 to September 1923 (no winter records some years), March 1929 to September 1933, August 1943 to November 1947. The maximum discharge during the period of record was 45,000 cfs (June 21, 1916) and the minimum observed, 115 cfs (March 1, 1929). The average discharge for 13 years (1910-12, 1915-16, 1918-19, 1920-21, 1929-33, 1943-47) was 2,294 cfs or 1,661,000 acre-feet per year. The highest annual runoff was 2,450,000 acre-feet (1916) and the lowest 914,800 acre-feet (1944). There are no significant diversions above the station.

Lake McDonald Outlet at Lake McDonald

The staff gage was located on the highway bridge at lower end of Lake McDonald, in Glacier National Park. The drainage area is 175 square miles. Records are available for some summer months during the period 1912-14. The maximum and minimum discharges were not determined. No diversions above station.

Middle Fork Flathead River near West Glacier (Belton)*

The water-stage recorder is three-quarters of a mile downstream from McDonald Creek, 1¼ miles west of West Glacier, and 3½ miles upstream from mouth. The drainage area is 1,128 square miles. Records are available from October 1939 to date (1965). The maximum discharge was 140,000 cfs (June 8, 1964), and the minimum, less than 173 cfs (November 27, 1952). The average discharge for 24 years was 2,864 cfs or 2,073,000 acre-feet. The highest annual runoff was 2,814,000 acre-feet (1959) and the lowest 1,040,000 acre-feet (1941). There are no significant diversions above the station.

South Fork Flathead River at Spotted Bear Ranger Station, near Hungry Horse*

The water-stage recorder is 600 feet south of Spotted Bear Ranger Station, 1,000 feet upstream from Spotted Bear River, and 40 miles southeast of Hungry Horse. The drainage area is 958 square miles. Records are available from August 1948 to September 1957, August 1959 to date (1965). The maximum discharge was 36,700 cfs (June 8, 1964), from slope-area measurement of peak flow, and the minimum, less than 121 cfs (December 26, 1952). The average discharge for 13 years (1948-57, 1959-64) was 1,921 cfs or 1,391,000 acre-feet per year. The highest annual runoff was 1,705,000 acre-feet (1950) and the lowest 1,065,000 acre-feet (1949). There are no diversions above the station.

Spotted Bear River near Hungry Horse

The water-stage recorder was a third of a mile upstream from mouth and 40 miles southeast of Hungry Horse. The drainage area is 184 square miles. Records are available from October 1948 to September 1956. The maximum discharge during the period of record was 5,480 cfs (May 20, 1954) and the minimum, 20 cfs (January 5, 1953), but may have been less during periods of ice effect. The maximum discharge during the flood of June 8, 1964 was 20,200 cfs, from slope-area measurement of peak flow. The average discharge for 8 years was 380 cfs or 275,100 acre-feet per year. The highest annual runoff was 324,100 acre-feet (1951) and the lowest 208,700 acre-feet (1949). There are no diversions above the station.

South Fork Flathead River above Twin Creek, near Hungry Horse*

The water-stage recorder is 1,000 feet downstream from Tin Creek, a quarter of a mile upstream from Twin Creek, and 36 miles southeast of Hungry Horse. The drainage area is 1,160 square miles. Records are available from October 1964 to date (1965). The maximum discharge during the flood of June 8, 1964 was 50,900 cfs, from slope-area measurement of peak flow. There are no diversions above the station.

Twin Creek near Hungry Horse*

The water-stage recorder is 300 feet upstream from road bridge, 0.1 miles upstream from mouth, and 36 miles southeast of Hungry Horse. The drainage area is 47.0 square miles. Records are available from August 1948 to September 1956, October 1964 to date (1965). The maximum discharge during the period of record was 2,790 cfs (May 19, 1954) and the minimum, 3.9 cfs (March 8, November 26, 1952), but may have been less during periods of ice effect. The maximum discharge during the flood of June 8, 1964 was 5,830 cfs, from slope-area measurement of peak flow. The average discharge for 8 years was 119 cfs or 86,150 acre-feet per year. The highest annual runoff was was 103,600 acre-feet (1950) and the lowest 66,160 acre-feet (1949). There are no diversions above the station.

Lower Twin Creek near Hungry Horse

The water-stage recorder was half a mile upstream from mouth and 35 miles southeast of Hungry Horse. The drainage area is 22.4 square miles. Records are available from August 1948 to September 1956. The maximum discharge during the period of record was 909 cfs (May 21, 1956) and the minimum, 0.8 cfs (January 28, 1952). The maximum discharge during the flood of June 8, 1964 was 5,110 cfs, from slope-area measurement of peak flow. The average discharge for 8 years was 69.4 cfs or 50,240 acre-feet per year. The highest annual runoff was 58,810 acre-feet (1950) and the lowest 40,890 (1949). There are no diversions above the station.

Soldier Creek near Hungry Horse*

The water-stage recorder is 200 feet upstream from bridge on west shore road and 35 miles southeast of Hungry Horse. The drainage area is 4.77 square miles. Records are available from October 1964 to date (1965). The maximum discharge during the flood of June 8, 1964 was 206 cfs, from slope-area measurement of peak flow. There are no diversions above the station.

Sullivan Creek near Hungry Horse*

The water-stage recorder is located a quarter of a mile downstream from Quintonkon Creek, 1 mile upstream from Hungry Horse Reservoir flow line, and 30 miles southeast of Hungry Horse. The drainage area is 71.3 square miles. Records are available from September 1948 to September 1956, August 1959 to date (1965). The maximum discharge during the period of record was 5,020 cfs (June 8, 1964), from slope-area measurement of peak flow, and the minimum daily, 10 cfs (November 26, 1952). The average discharge for 12 years was 217 cfs or 157,100 acre-feet per year. The

highest annual runoff was 200,300 acre-feet (1960) and the lowest 129,000 cfs (1949, 1953). There are no diversions above the station.

Grave Creek near Hungry Horse*

The water-stage recorder is 500 feet upstream from Hungry Horse Reservoir flow line, and 2 miles southeast of Hungry Horse. The drainage area is 27.0 square miles. Records are available from August 1948 to September 1956, October 1964 to date (1965). The maximum discharge during the period of record was 1,520 cfs (June 22, 1950) and the minimum daily, 4.5 cfs (November 26, 1952). The maximum discharge during the flood of June 8, 1964 was 2,710 cfs, from slope-area measurement of peak flow. The average discharge for 8 years (1948-56) was 134 cfs or 97,010 acre-feet per year. The highest annual runoff was 121,300 acre-feet (1950) and the lowest 76,180 acre-feet (1953). There are no diversions above the station.

Canyon Creek near Hungry Horse*

The water-stage recorder is 50 feet downstream from bridge on east shore road, 400 feet upstream from Hungry Horse Reservoir flow line, and 18 miles southeast of Hungry Horse. The drainage area is 4.59 square miles. Records are available from October 1964 to date (1965).

Wounded Buck Creek near Hungry Horse*

The water-stage recorder is 50 feet upstream from culvert on west shore road, 800 feet upstream from Hungry Horse Reservoir flow line, and 9 miles southeast of Hungry Horse. The drainage area is 13.6 square miles. Records are available from October 1964 to date (1965). The maximum discharge during the flood of June 8, 1964 was 706 cfs, from slope-area measurement of peak flow.

Emery Creek near Hungry Horse*

The water-stage recorder is 500 feet upstream from Hungry Horse Reservoir flow line, on east shore road, and 6 miles southeast of Hungry Horse. The drainage area is 26.4 square miles. Records are available from October 1964 to date (1965). The maximum discharge during the flood of June 8, 1964 and 832 cfs, from slope-area measurement of peak flow.

South Fork Flathead River near Columbia Falls*

The water-stage recorder is 1½ miles downstream from Hungry Horse Dam, 3½ miles upstream from mouth, and 7 miles east of Columbia Falls. The drainage area is 1,663 square miles. Records are available from September 1910 to January 1911 (discharge measurements only), February 1911 to September 1913 (no winter records), October 1913 to August 1916 (scattered daily discharge only), April 1923 to November 1924 (no winter records) July to October 1925, May to November 1927, May 1928 to date (1965). The maximum discharge observed during the period of record was 46,200 cfs (June 19, 1916) and the minimum observed, 7.3 cfs (September 24, 1951), result of dam closure. The average discharge for 35 years (1928-63) was 3,461 cfs or 2,506,000 acre-feet per year, adjusted for storage. The highest annual runoff was 3,856,000 acre-feet (1959) and the lowest 732,600 acre-feet (1953), adjusted for storage. There is complete regulation by Hungry Horse Reservoir.

Flathead River at Columbia Falls*

The water-stage recorder is 200 feet downstream from county bridge at Columbia Falls and 5 miles downstream from South Fork. The drainage area is 4,464 square miles. Records are available from May 1922 to September 1923 (fragmentary), June 1928 to date (1965). The maximum discharge was 176,000 cfs (June 9, 1964) and the minimum, 798 cfs (December 8, 1929). The average discharge for 35 years (1928-63) was 9,522 cfs or 6,894,000 acre-feet per year, adjusted for change in contents in Hungry Horse Reservoir since October 1, 1951. The highest annual runoff was 9,648,000 acre-feet (1959) and the lowest 3,488,000 acre-feet (1941). Regulation of about one-third flow by Hungry Horse Reservoir.

Flathead River near Kalispell

The chain gage was located at highway bridge, 3 miles east of Kalispell. Records are available (gage heights only) from May 1928 to September 1945. The maximum elevation observed was 2,913.95 feet (May 27, 1928) and the minimum elevation observed, 2,899.25 feet (December 17, 1940). Datum of gage is at mean sea level (Somers datum).

Logan Creek at Tally Lake near Whitefish

The staff gage was located 2½ miles downstream from Tally Lake and 10 miles west of Whitefish. The drainage area is 183 square miles. Records are available from August 1931 to August 1934 (fragmentary), May 1936 to September 1942, May 1945 to September 1947. The maximum discharge observed was 1,380 cfs (May 11, 1947) and the minimum observed, 0.7 cfs (September 1, 2, 1940). The average discharge for 8 years (1936-42, 1945-47) was 75.0 cfs or 54,300 acre-feet per year. The highest annual runoff was 125,600 acre-feet (1947) and the lowest 15,920 acre-feet (1941). There is natural storage in Tally Lake.

Logan Creek near Whitefish

The staff gage was located 100 feet upstream from Good Creek and 10 miles northwest of Whitefish. The drainage area is 199 square miles. Records are available from April to September 1931. The maximum discharge observed during the period was 240 cfs (May 8) and the minimum observed, 1.2 cfs (September 4, 5). There is natural storage in Tally Lake.

Stillwater River near Whitefish

The water-stage recorder was located 600 feet downstream from highway bridge, 7 miles southwest of Whitefish, and 10 miles upstream from Whitefish River. The drainage area is 524 square miles. Records are available from October 1930 to September 1950. The maximum discharge was 4,330 cfs (May 26, 1948) and the minimum daily, 40 cfs (December 24, 1944). The average discharge for 20 years (1930-50) was 340 cfs or 246,100 acre-feet per year. The highest annual runoff was

405,400 acre-feet (1948) and the lowest 90,200 acre-feet (1944). There are a few diversions for irrigation above the station.

Stillwater River near Kalispell

The staff gage was located on highway bridge 5 miles upstream from Whitefish River and 5 miles north of Kalispell. The drainage area is 537 square miles. Records are available from October to December 1906, January to May 1907 (gage heights only), May to August 1922, July 1928 to October 1930 (fragmentary). The maximum discharge observed was 2,750 cfs (May 22, 1922) and the minimum observed, 26 cfs (November 11, 1929). There were no diversions above the station.

Whitefish River near Kalispell

The water-stage recorder was located 8 miles upstream from mouth and 8 miles north of Kalispell. The drainage area is 170 square miles. Records are available from August to November 1928, April 1929 to September 1950. The maximum discharge was 1,290 cfs (May 30, 1948) and the minimum, 4.5 cfs (October 18, 1934). The average discharge for 21 years (1929-50) was 191 cfs or 138,300 acre-feet per year. The highest annual runoff was 202,400 acre-feet (1934) and the lowest 73,990 acre-feet (1944). There were diversions for Whitefish municipal water supply and for irrigation of about 120 acres above the station. Some regulation by Whitefish Lake.

Flathead River at Demersville

The wire-weight gage was located at Demersville, 3 miles south of Kalispell. Records are available (gage heights only) from April 1909 to July 1912, April 1928 to September 1945. The maximum elevation observed was 2,904.94 feet (June 17, 1933) and the minimum elevation observed, 2,881.86 feet (December 18-26, 1936). Datum of gage is at mean sea level (Somers datum).

Ashley Creek near Kila

The staff gage was located on upstream end or right abutment of bridge, about 1½ miles downstream from Ashley Lake, and 7 miles northwest of Kila. The drainage area is 44.2 square miles. Records are available from August to November 1916. The maximum discharge observed during the period was 20 cfs (August 9) and the minimum observed, 4.2 cfs (September 29). There are no diversions above the station. Floodwater stored in Ashley Lake for release during irrigation season.

Ashley Creek near Kalispell

The wire-weight gage was located 2½ miles downstream from Smith Lake, and 5 miles west of Kalispell. The drainage area is 201 square miles. Records are available from May 1931 to February 1933, June 1934 to September 1950. The maximum discharge was 749 cfs (May 27, 1948) and the minimum, no flow at times. The average discharge for 17 years (1931-32, 1934-50) was 30.4 cfs or 22,010 acre-feet per year. The highest annual runoff was 78,940 acre-feet (1948) and the lowest 1,080 acre-feet (1941). There are diversions for irrigation of about 100 acres above the station. Floodwater stored in Ashley Lake for release during irrigation season.

Flathead River at Damon Ranch near Kalispell

The wire-weight gage was located at Damon Ranch, 7 miles southeast of Kalispell. Records are available (gage heights only) from April 1909 to July 1912, May 1928 to September 1945. The maxi-

mum elevation observed was 2,900.94 feet (June 17, 1933) and the minimum elevation observed, 2,881.55 feet (January 27-31, 1937). Datum of gage is at mean sea level (Somers datum).

Flathead River at Therriault Ferry near Kalispell

The staff gage was located at Therriault Ferry, 9 miles southeast of Kalispell. Records are available (gage heights only) from October 1934 to September 1945. The maximum elevation observed was 2,894.23 feet (May 16, 1936) and the minimum elevation observed, 2,881.28 feet (January 21-23, 1937). Datum of gage is at mean sea level (Somers datum).

Flathead River near Holt

The staff gage was located at Keller Ranch, 0.7 miles upstream from Holt. Records are available (gage heights only) from April 1909 to July 1912, June 1928 to September 1938, October 1939 to September 1945. The maximum elevation was 2,897.35 feet (May 29-30, 1928), from floodmark, and the minimum observed, 2,881.24 feet (January 25-28, 1930). Datum of gage is at mean sea level (Somers datum).

Little Bitterroot River near Marion

The staff gage was located at log bridge 70 feet downstream from outlet of Little Bitterroot Lake and 2 miles southwest of Marion. The drainage area is 31.8 square miles. Records are available from January 1910 to September 1916 (no winter records 1911-14). The maximum discharge observed was 53 cfs (April 27, 1916) and the minimum, no flow (January 19-23, 1915). There was natural storage in Little Bitterroot Lake with some regulation by temporary dams at lake outlet.

Little Bitterroot River near Hubbart

The staff gage was located upstream from the canyon leading to the second fall of Little Bitterroot River, 1½ miles west of Hubbart, and 15 miles south of Marion. The drainage area is 134 square miles. Records are available from April 1909 to September 1916 (no records most winter months). The maximum discharge observed was 340 cfs (May 6, 1916) and the minimum observed, 1.4 cfs (October 20-27, November 10, 1914). There were no diversions above the station. Natural storage in Little Bitterroot Lake with some regulation by temporary dams at lake outlet.

Partial Record Stations and Miscellaneous Discharge Measurements

In order to provide information on more streams than are covered by stream gaging stations, the U. S. Geological Survey has for several years been collecting some partial records. These are in addition to the miscellaneous discharge measurements which have always been reported. These partial records, when correlated with simultaneous discharges of nearby continuous-record stations give fair indications of available flow.

There are five crest-stage partial-record stations in the Flathead River Basin in Flathead County. Stations are now (1965) being operated on Skyland Creek near Essex (former continuous record site), Moccasin Creek near West Glacier, Middle Fork Flathead River tributary at West Glacier, and Rock Creek near Olney.

The partial-record stations as well as the miscellaneous discharge measurements are listed at the end of each U. S. Geological Survey Water-Supply Paper or Surface Water Records report.

RESERVOIRS

Details of operation records of the following reservoirs are available in U. S. Geological Survey publications.

Hungry Horse Reservoir near Hungry Horse*

The water-stage recorder is located in block 14 of Hungry Horse Dam, 3 miles southeast of Hungry Horse. The drainage area is 1,654 square miles. Records are available from September 1951 to date (1965). The maximum contents observed was 3,461,000 acre-feet (July 3-4, 1955, August 6, 1956) and the minimum contents observed since normal low operating level reached in May 1952, 607,700 acre-feet (January 13, 1953). Storage began September 21, 1951. The usable capacity is 3,428,000 acre-feet. Water is used for power, flood control, irrigation and recreation.

Flathead Lake near Holt

The staff gage was located 2 miles east of the mouth of the Flathead River near Holt. Records are available from April 24 to August 5, 1900. The maximum elevation observed was 12.60 feet (May 17) and the minimum elevation observed, 4.00 feet (August 4-5). Datum of gage is unknown.

Flathead Lake at Somers*

The water-stage recorder is at the steamboat dock at Somers. The drainage area is 7,086 square miles. Records are available from January 1910 to date (1965). They were published as "at Polson" prior to April 1923. Staff-gage readings were reported prior to 1924. Some supplemental readings were obtained in 1900, 1908 and 1909. The Polson readings were obtained at the south end of the lake at Polson in Lake County. The maximum contents was 2,208,000 acre-feet (June 19, 1933) and the minimum 347,000 acre-feet (December 5, 1936). The lake was nearly 4 feet higher during the flood of June 1894. Natural storage was increased by construction of Kerr Dam 4 miles downstream from natural lake outlet. Storage began April 11, 1938. The usable capacity is 1,791,000 acre-feet. Water is used for power, flood control, irrigation and recreation.

Little Bitterroot Lake near Marion*

The staff gage is at dam on Little Bitterroot River, 2 miles southwest of Marion. The drainage area is 31.8 square miles. Records of month-end contents are available for December 1939, April 1940, September 1940 to date (1965). The maximum month-end contents was 26,880 acre-feet (May 31, 1959) and the minimum, no storage at times (1939-46). The usable capacity is 26,400 acre-feet (24,000 acre-feet prior to 1960).

Hubbart Reservoir near Niarada*

The reservoir is located on Little Bitterroot River, 9 miles northwest of Niarada. The drainage area is 114 square miles. Records of month-end contents are available for December 1939, April 1940, September 1940 to date (1965). The maximum month-end contents was 13,050 acre-feet (May

31,1959) and the minimum, no storage September to December 1958. The usable capacity is 12,120 acre-feet.

*This gaging station is now in operation (1965).

ECONOMIC MINERAL RESOURCES

Mining

Flathead County occupies part of the Northern Rocky Mountain physiographic province, which fronts the Great Plains. Within the county, rugged and lofty mountain ranges are separated by linear intermontane valleys trending northwestward. Mountain ranges in the area include parts of the Salish and Whitefish Mountains in western Flathead County, the northern extremities of the Mission, Swan, Flathead, and Lewis and Clark Ranges in central and southeastern Flathead County, and the Livingston Range of Glacier National Park in the northeastern Flathead County. The western part of the county is traversed by the remarkably straight and narrow Rocky Mountain Trench, a structural depression several hundred miles in length which, south of the Canadian line, occupies the Stillwater and Flathead Valleys.

Sedimentary rocks ranging in age from Precambrian to Recent underlie the county. These include quartzite, argillite, and impure limestone and dolomite of Precambrian age, quartzite, shale, limestone, and dolomite of Cambrian, Devonian, and Mississippian age, and the Ellis Group (Jurassic) and Kootenai Formation (Cretaceous). Tertiary igneous rocks comprise flows and intrusive bodies in the Hog Heaven district in the southwest part of the county. Scattered metadiorite sills and dikes penetrate Precambrian sedimentary rocks.

The Lewis overthrust is the master structural feature of the region. It borders the northwestern edge of the Rocky Mountains in Glacier Park and swings southwestward in Theodore Roosevelt Pass to within 7 miles of the Middle Fork of the Flathead River, where it again swings to the southeast. Normal faults of large displacement parallel the edges of the major ranges.

Mining activity within the county commenced about 1890, when copper showings were discovered within the present bonndaries of Glacier National Park and along tributaries of the South Fork Flathead River. The activity ceased when it was determined that the quantity of minerals was insufficient to be commercial.

By 1898, numerous prospects had been located at the head of Whitefish River in the Kintla Lakes area, at the head of McDonald Creek between Bear Creek and Java, and along the Middle Fork River, but no ore was shipped during the late 1890's.

Free-gold prospects were reported in the region of the South Fork Flathead River and the Swan Range, a gold placer being located on Willow Creek, now known as Danaher Creek, south of Big Prairie on the South Fork.

High-grade silver-lead ore was found in the Hog Heaven district in 1913, but development work was discontinued when the ore body pinched out. The Flathead Mine, discovered in 1928, produced during 1928-30 about 20,000 tons of ore yielding 1,500,000 ounces of silver. The mine was again active during the periods 1934-46 and 1958-64, accounting for most of the mineral produced in Flathead County.

Hog Heaven District

The Hog Heaven District lies 15 miles west of Flathead Lake in the Salish Mountains. Productive properties in the area include the Flathead, West Flathead, Ole, Birdseye, Martin, and Battle Butte mines.

Ore occurs as replacement deposits in volcanic flows and agglomerates, in dikes and plugs intruding volcanic rocks, in Belt Series (Precambrian) sedimentary rocks, and in fumarole holes penetrating Belt Series rocks adjacent to igneous bodies.

Total production from the district to date amounts to 248,804 tons of ore containing 8,433,912 ounces of silver and 23,637,398 pounds of lead having a gross value of $6,033,839. The Flathead and West Flathead properties produced most of the ore mined in the district.

Star Meadows District

The Star Meadows District, lying west of Tally Lake, northwest of Kalispell, was first prospected just prior to 1900; the first mine located in the district was the West Virginia, which produced about a carload (60 tons) of silver-gold-copper ore. Other properties that have produced small tonnages of copper ore are the Foolsberg and Blacktail mines.

Copper, silver, and gold are associated with quartz and siderite in east-striking veins occupying faults. The country rock in the area consists of banded argillite and calcareous argillite of the Belt Series (Precambrian).

COAL

North of Columbia Falls near the North Fork Flathead River are lignite beds in the lower part of the Kishenehn Formation (Tertiary). Small-scale mining operations were carried on during the 1930's and until the mine was closed at the beginning of World War II.

Black Lignite is interbedded with clay and sandstone in a zone 25 feet thick. The upper 6 to 8 feet of this zone was mined to exploit a 3-foot lignite seam.

The coal bed was developed through an adit on the west bank of the North Fork Flathead River.

OIL AND NATURAL GAS

Rare oil and gas seeps have been reported by several ranchers in Flathead Valley while drilling water wells. Two shallow exploration drill holes penetrated gravel, sand, and clay to depths of 700 and 1,475 feet.

Oil seepages were reported at Kintla and Bowman Lake, and in 1905 a small quantity of high-gravity oil was discovered during drilling operations on the North Fork Flathead River near Kintla Lake.

In the early 1960's the Shell Oil Company conducted a geophysical (seismic) survey along U. S. Highway 2 in the Theodore Roosevelt Pass area. The company subsequently dropped their leases without drilling. They were possibly looking for oil-bearing strata beneath the Lewis overthrust.

SAND AND GRAVEL

Heterogeneous mixtures of gravel and sand occur in moraines within Flathead Valley and as stream alluvium bordering Flathead River. Several companies are excavating gravel and sand for road construction and other uses.

SOIL AND WATER CONSERVATION DISTRICTS

Flathead County is served by the Flathead Soil and Water Conservation District which was organized in 1945. The area of Flathead County is 3,313,280 acres.

The district is governed by a board of five supervisors who are elected for 3-year terms by land occupiers of the district. They carry out a program of complete resource conservation including erosion control, water conservation, soil management, land improvement, wildlife management, recreation, and land adjustment to proper use. This program is accomplished by providing technical assistance to groups and individual farmers and ranchers, on a voluntary basis, the analyzing of all resources, and planning and applying of economically sound conservation treatment.

Under State law, the supervisors have the power to call upon local, state, and federal agencies to assist in carrying on a soil and water conservation program. The Flathead Soil and Water Conservation District has memoranda of understanding with the Soil Conservation Service, Extension Service, State Forestry Department, and the U. S. Forest Service to provide technical assistance to district co-operators in carrying out sound soil and water conservation programs. Close working relations are maintained with the Farmers Home Administration, Agricultural Stabilization and Conservation Service, State Fish and Game Department, and Technical Action Panel for rural area development.

The Soil Conservation Service assists the district by furnishing and interpreting basic data on soils and plant cover and other land features. Technical data is interpreted in terms of acceptable alternative land uses and treatments to help guide the farm and ranch operators in developing sound individual or group conservation plans. It also aids co-operators in performing operations requiring technical skills beyond the experience of the individuals involved.

The Office of the State Forester and the U. S Forest Service co-operate with the district by co-ordinating the programs of timber management, tree planting, forest and range fire control, and watershed management on federal, state, and private lands.

The Extension Service assists the district with its education and information program. An important function of the district is to inform land owners and occupiers of the benefits derived from the wise use of the communities' soil and water resources.

Cost sharing for many conservation practices is available through the Agricultural Conservation Program and conservation loans are available through the Farmers Home Administration.

The State Fish and Game Department co-operate in matters involving streams, lakes, ponds, and other wildlife aspects of the program.

One of the major problems of the district is to acquaint the urban people, who comprise a large percentage of the total population of the district, with the need for soil and water conservation.

Technical phases of the district's program include detailed soil surveys, range site and condition classes, forest site and utilization investigations, ground water investigations, drainage studies,

irrigation potentials, topographic and other engineering surveys. By a careful analysis of this basic resource information, proper land use and needed conservation treatment of each field can be determined. The technicians interpret the surveys and provide the district co-operator with alternatives in land use and treatment that will enable him to treat the hazards and limitations that occur on each tract of land. With this information and by counseling with technicians, the co-operator makes the final decisions. These decisions are recorded in the Conservation Plan. The co-operator determines what will be done on his farm or ranch and when the jobs will be carried out.

After the plan is completed the co-operator is given further technical assistance on design and layout work essential in establishing conservation practices on the land as called for in the Conservation Plan. This technical assistance is provided without cost to the co-operating farmer or rancher.

There are approximately 131,500 acres of cropland, 30,000 acres of seeded pasture and hay, 52,500 acres of rangeland, 681,000 acres of woodland, and 23,500 acres considered other lands such as water, roads, townsites, airports, and highways on which the district shares the conservation responsibility.

According to the State Engineer's Office, Water Resources Survey there are 27,725 acres irrigated and this may be increased to more than 35,000 acres by 1975. One irrigation project, Ashley Irrigation District, distributes water to about 2,658 acres. A large percentage of the irrigated acres in the valley are under sprinkler systems, with pumping plants from streams and rivers. Some flood irrigation is done from smaller streams beyond the valley proper.

There are 2,361,495 acres of federal lands (U. S. Forest Service, National Park Service, U. S. Bureau of Reclamation, and Bureau of Land Management), 131,304 acres of state land, and 8,000 acres of Bureau of Indian Affairs land. This land is largely woodland, Glacier National Park, Hungry Horse Reservoir area, and some rangeland.

The major enterprises on agricultural lands are grain and livestock production. Beef cattle, sheep, and swine are produced. Much of the range for beef-type cattle is provided through lease of forest lands owned by corporations, federal, and state. Cash crops besides grains are potatoes and sweet cherries.

Work done since the organization of the district on cropland consists largely of improved cropping systems, improved management of crop residues, improvement and installation of irrigation systems—both sprinkler and flood, seeding of pastures and haylands to adapted grasses and legumes, installation of water and erosion control structures, farm drainage systems, soil management, and improvement of wildlife habitat. On dryland pasture, range, and grazed woodland the work has consisted of improvement of existing cover by deferred-rotation grazing, fencing, livestock water development, and improvement of wildlife habitat. On private woodlands emphasis has been toward stand improvement for long-term timber production plus production of high quality Christmas trees. Thinning, pruning, and weeding have been emphasized along with improved methods of harvest.

Since the district was organized, assistance has been given on proper cropping systems and residue management on 45,000 acres, 225 sprinkler systems including about 10 miles of permanently located mainline, 36 irrigation reservoirs and pits, 170 structures for water and erosion control, 26 miles of irrigation canal and field ditches, 6,000 acres of land cleared, 10,000 acres of hay and pasture planted, pasture and range management on 20,000 acres, 40 livestock water ponds constructed, 47 wells drilled, 47 springs developed, 110 miles of drain ditch constructed, 8 miles of tile

drain installed, 53 acres of farmstead and feedlot windbreaks planted, 8 miles of field windbreaks established, 212 acres of trees planted, 32 ponds stocked with fish, wildlife habitat preservation (natural areas) and planting on 450 acres, and improved methods of managing woodlands on 16,000 acres.

A Conservation Needs Inventory was completed in 1959 for Flathead County as a part of a national inventory of needs. In Flathead County it was estimated that about 61 percent of dryland cropland, 36 percent of irrigated cropland, 78 percent of grasslands, and nearly all of the woodlands were in need of additional conservation treatment. One of the big problems on woodlands is an outlet for small, round, wood products which are a by-product of thinning operations.

A considerable amount of the conservation work has been accomplished through efforts of organized groups and this is encouraged wherever possible.

Co-operative efforts of land owners and operators; groups; local, state, and federal agencies; civic organizations; local businessmen; and news media have contributed to the overall success of the district.

FISH AND GAME

The terrain of Flathead County is greatly diversified, ranging from sheer mountains through timbered valleys into rich agricultural lowlands. The Flathead River is the major water course through this county. Both the main river and tributaries, many glacier-fed, offer sport fishing with backgrounds of unexcelled mountain beauty. A myriad of jewel-like lakes stud the mountain ranges. Hungry Horse Reservoir and Flathead Lake are the two largest bodies of water in western Montana.

In Flathead Lake and upstream in nearly all tributaries of this great drainage a variety of fishing and vacation pleasures are in store. Flathead Lake contains cutthroat, Dolly Varden, kokanee, bass, lake trout, and whitefish. Lake Mary Ronan, Whitefish Lake, and other smaller lakes situated near the Flathead should never be overlooked for a fishing outing.

Notable streams in the upper Flathead system are the North, South, and Middle Forks which are mainly cutthroat and Dolly Varden waters. The Swan River which also drains into the Flathead provides cutthroat, rainbow, Dolly Varden, and kokanee. Many lakes offer excellent cutthroat fishing, while a number have bass, Dolly Varden, lake trout, kokanee, and whitefish as well.

The county, like much of western Montana, is typically whitetailed deer habitat, though mulies are found in many areas. Black bear, too, are abundant here and the silver-tip or grizzly, monarch among bears, stalks the more remote hinterlands and wilderness. Some bighorn sheep still inhabit certain highlands of the Flathead, while still higher on the steep slopes and precipices of mountains that drain to the Swan and Flathead Rivers, some of Montana's finest mountain goat herds await hunters who have the stamina for climbing to their lofty domain. Elk range over a large part of the country while moose frequent the northern drainages.

Ring-necked pheasants thrive in some of the valley's agricultural lands and Hungarian partridge are found in some spots. The mountains are best suited to native grouse species, including ruffed, blue, and Franklin's grouse. Waterfowl find the many water areas to suit their needs and a variety of migratory birds, including ducks and geese, raise their broods here. Islands in Flathead Lake are especially important to reproduction of the regal Canada goose, or honker. The soaring bald eagle, the swift osprey, and the raucous raven are among the larger bird life commonly seen.

THE FLATHEAD NATIONAL FOREST

National Forest lands in Flathead County comprise 53 percent of the total acreage of the county; 1,778,795 out of 3,313,280 acres. Flathead National Forest and a small portion of the Kootenai and Lolo National Forests are located in Flathead County. These lands are managed by Forest Rangers at Whitefish, Big Creek, Hungry Horse, Spotted Bear, and Big Prairie on the Flathead National Forest, and Raven and Murphy Lake on the Kootenai National Forest, and Plains on the Lolo National Forest.

Roughly 80 percent of the land in Flathead County is classed as public domain. This includes National Forest, National Park, and state lands. A large portion of Glacier National Park is in Flathead County.

Originally almost all of Flathead County was within the boundaries of either the Lewis and Clark Forest Reserve or the Blackfoot Forest Reserve. The Lewis and Clark Forest Reserve covered the eastern half of the county including the part that is now Glacier National Park. The Blackfoot Forest Reserve covered the western half of the county.

These forest reserves were set aside by President Cleveland in 1897. The old forest reserves were broken into the National Forest system in 1908 by President Theodore Roosevelt. Glacier National Park was taken out of the forest reserve in 1910.

Explorers, fur traders, and prospectors first came into the Flathead area in the 1850's and 60's. Settlers came into the Flathead Valley in the 1870's. Many settlers came to the Flathead country after the Homestead Act of 1911. Most of these later homesteaders settled in the Flathead Valley and along the main forks of the Flathead River from the Canadian boundary on the North Fork to Danaher Meadows on the South Fork.

The terrain of the National Forest varies widely: hilly-timbered country in the Tally Lake area; broad U-shaped valleys in the North Fork; steep V-shaped valleys in the South Fork; hanging valleys in the Middle Fork; and subalpine basins in the Continental Divide country.

The Continental Divide forms the east boundary of Flathead County and the Flathead National Forest. Elevations in the forest range from 3,100 feet to 9,300 feet. Country along the Continental Divide is steep and very rugged.

Precipitation varies from 15 inches in the Flathead Valley to more than 60 inches in the higher elevations. Most of the precipitation is in the form of snow. A 10-foot snowpack is not uncommon at the higher levels. The wettest month is June, with an average of 2 inches of rain. Lower elevations are generally covered with snow from December through April; higher elevations are snow covered from November through June.

Water, forage, game, recreation, and wood resources of the National Forest make significant contributions to the Flathead County economy.

Grazing is a minor resource in National Forest land of Flathead County. Most of the National Forest range is of transistory nature.

Recreational use is increasing rapidly in the Flathead National Forest. The big attractions are Flathead Lake, Hungry Horse Reservoir, the Bob Marshall Wilderness, and the Big Mountain Ski Area. Skiing is becoming one of the fastest-growing winter sports; Big Mountain provides some of the finest skiing in the Northwest.

Many lakes and streams provide excellent fishing. Approximately 36,000 acres of lakes and miles of stream provide fishing. Hunting is a big attraction. Nowhere else in the continental United States is there hunting like there is in Flathead County. White-tail deer, mule deer, elk, moose, black bear, grizzly bear, and mountain goat are important big game animals. Pheasant, spruce grouse, ruffed grouse, blue grouse, ducks, and geese provide very good bird hunting. Hunter visits to the National Forest are increasing rapidly.

The major part of the Bob Marshall Wilderness and part of the Mission Mountains Primitive Area are within Flathead County. Both areas provide good hunting and fishing and outstanding scenery and opportunities for wilderness experience. Sightseeing and pack trips in these areas are increasing in popularity.

General camping and picnicking are increasing with the addition of new National Forest campgrounds, picnic areas, swimming and boating areas. The 22,500-acre Hungry Horse Reservoir provides excellent camping, picnicking, boating, and fishing. New campgrounds will add to the use of the Reservoir area.

Large stands of virgin timber cover the National Forest lands. Under sustained-yield management, mature trees being cut now will be replaced in one-hundred-forty years by a new crop of mature trees, thus providing an endless supply of timber. Considerable road construction and logging have taken place since World War II. Prior to this, logging was done in areas close to the valley.

Headrig capacity of the Flathead area timber mills is at present 300 million board feet. Flathead National Forest allowable annual cut is 136 million board feet. The remainder of the volume is cut in the Kootenai National Forest, State Forest lands, the Flathead Indian Reservation, and private land. The annual allowable cut from National Forest lands in Flathead County is 116 million board feet.

Water is still and always will be the most important National Forest resource. Because the Flathead is one of the headwaters of the Columbia River system, watershed management is very important. While water is one of the most diffieult resources to place a dollar value on, water can be measured by: the recreationist, the farmer who irrigates, and by the power companies. Heavy snowfalls in the higher elevations store water for release into the Columbia River system in the summer. Hungry Horse Dam, operated by the Bureau of Reclamation, provides valuable storage for the South Fork's snow runoff. This water is used for power generation from December through May.

Soils within the forest boundary are quite stable, with a few exceptions. These exceptions are the soils at higher elevations, along the Continental Divide in the Middle Fork of the Flathead River. Timber is not cut and grazing is not allowed in areas of unstable soil. When timber is being cut or roads constructed in any soils, precautions are taken to prevent erosion or stream pollution.

The continuing wise use of the renewable natural resources in the National Forests of Flathead County is the management objective of the U. S. Forest Service. The five major resources of the land are: wood, water, forage, wildlife, and recreation. Each resource receives equal consideration in management planning in the National Forests.

SUMMARY OF IRRIGATED LAND BY RIVER BASINS IN THE FOLLOWING COUNTIES COMPLETED TO DATE

Big Horn, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Deer Lodge, Fallon, Flathead, Gallatin, Golden Valley, Granite, Jefferson, Judith Basin, Lake, Lewis & Clark, Lincoln, Madison, Meagher, Missoula, Musselshell, Park, Pondera, Powder River, Powell, Ravalli, Rosebud, Silver Bow, Stillwater, Sweet Grass, Teton, Treasure, Wheatland, Wibaux and Yellowstone.

RIVER BASIN	Present Irrigated Acres	Irrigable Acres Under Present Facilities	Maximum Irrigable Acres
Missouri River Drainage Basin			
*Missouri River	107,339.50	24,787.33	132,126.83
Jefferson River	61,291.00	9,713.00	71,004.00
Beaverhead River	40,771.00	6,076.00	46,847.00
Big Hole River	23,775.00	1,950.00	25,725.00
Madison River	39,445.00	7,660.00	47,105.00
Gallatin River	111,914.00	21,097.00	133,011.00
Smith River	32,934.00	19,679.00	52,613.00
Sun River	124,474.58	4,385.00	128,859.58
Marias River	114,685.42	13,415.88	128,101.30
Teton River	74,653.00	15,882.33	90,535.33
Musselshell River	64,789.00	57,870.00	122,659.00
Milk River	2,334.00	2,595.33	4,929.33
Yellowstone River	303,501.00	96,148.00	399,649.00
Stillwater River	27,489.00	16,403.00	43,892.00
Clarks Fork River	91,768.00	24,195.00	115,963.00
Big Horn River	65,395.00	25,579.00	90,974.00
Tongue River	28,170.00	7,762.00	35,932.00
Powder River	35,948.00	2,299.00	38,247.00
Little Missouri River	42,513.00	1,499.00	44,012.00
Grand Total Missouri River Basin	**1,393,189.50**	**358,995.87**	**1,752,185.37**
Columbia River Drainage Basin			
Columbia River	0	0	0
Kootenai (Kootenay) River	9,914.13	968.00	10,882.13
Clark Fork (Deer Lodge) (Hellgate) (Missoula) River	146,287.70	14,934.20	161,221.90
Bitterroot River	111,102.43	3,200.00	114,302.43
Flathead River	135,907.19	4,532.22	140,439.41
Grand Total Columbia River Basin	**403,211.45**	**23,634.42**	**426,845.87**
Grand Total in the Counties Completed to Date	**1,796,400.95**	**382,630.29**	**2,179,031.24**

*Names of streams indented on the left-hand margin indicate that they are tributaries of the first stream named above which is not indented.

IRRIGATION SUMMARY OF FLATHEAD COUNTY BY RIVER BASINS

RIVER BASIN	Present Irrigated Acres	Irrigable Acres Under Present Facilities	Maximum Irrigable Acres
COLUMBIA RIVER BASIN			
*Columbia River	0	0	0
Kootenai (Kootenay) River	0	0	0
Fisher River	0	0	0
Loon Lake	0	0	0
Pleasant Valley Fisher River	1,685.00	0	1,685.00
Pearson Creek	102.00	0	102.00
Hammond Creek	44.00	0	44.00
Jakes Spring	42.00	0	42.00
Johnson Creek	20.00	0	20.00
Markus Creek	36.00	0	36.00
Carefull Creek	193.00	0	193.00
Pleasant Valley (Meadow) Creek	422.00	0	422.00
Willow (Nolan) Creek	32.00	0	32.00
Spring	10.00	0	10.00
Total Kootenai River and Tributaries	2,586.00	0	2,586.00
Clark Fork River	0	0	0
Flathead River	1,108.00	82.00	1,190.00
Abbott (Martin) (Gold) (E. Fk.) (N. Abbott) Creek	39.00	0	39.00
South Fork Flathead River	0	0	0
Well	23.00	0	23.00
Stanley Creek	62.00	0	62.00
Cedar (Crystal) (Bad Rock Canyon) (Trout) Creek	33.00	0	33.00
Well	3.00	0	2.00
Well	1.00	0	1.00
Well	7.00	0	7.00
Well	5.00	0	5.00
Slough	15.00	0	15.00
Well	20.00	0	20.00
Well	60.00	0	60.00
Spring	57.00	0	57.00
Slough	436.00	0	436.00
Well	15.00	0	15.00
Pressentine Slough	0	0	0
Unnamed Slough	0	0	0
Well	0	101.00	101.00
Well	77.00	0	77.00
Lake Everly Creek	0	0	0
Lake Everly	362.00	83.00	445.00
Well	2.00	0	2.00
Muskrat Lake	360.00	0	360.00
Slough	91.00	0	91.00
Well	17.00	0	17.00
Stillwater River	3,202.00	426.00	3,628.00
Bootjack Lake	0	0	0
Outlet of Bootjack Lake	50.00	40.00	90.00
North Lost (Little Lost) Creek	146.00	21.00	167.00

*Names of streams indented on the left-hand margin indicate that they are tributaries of the first stream named above which is not indented.

IRRIGATION SUMMARY OF FLATHEAD COUNTY BY RIVER BASINS

RIVER BASIN—(Continued)	Present Irrigated Acres	Irrigable Acres Under Present Facilities	Maximum Irrigable Acres
Lost (Love) Lake	315.00	0	315.00
Spring	23.00	0	23.00
Merton Spring Creek	91.00	0	91.00
Spring	520.00	0	520.00
Moon Lake	77.00	0	77.00
Horntvedt Lake	246.00	0	246.00
Barta Lake	182.00	0	182.00
Whitefish River	1,765.00	136.00	1,901.00
Whitefish Lake	115.00	0	115.00
Snyder Creek	20.00	0	20.00
Well	2.00	0	2.00
Nigger Lake	43.00	0	43.00
Haskill (Cedar) (Second) Creek	240.00	0	240.00
Motichka Creek	0	0	0
Spring	1.00	0	1.00
Joyces Lake	30.00	20.00	50.00
Well	22.00	0	22.00
Well	78.00	0	78.00
Well	5.00	0	5.00
Well	5.00	0	5.00
Well	125.00	0	125.00
Well	2.00	0	2.00
Well	5.00	0	5.00
Total Whitefish River and Tributaries	**2,458.00**	**156.00**	**2,614.00**
(East) Spring Creek	1,757.00	2.00	1,759.00
Well	80.00	0	80.00
Well	76.00	0	76.00
Well	40.00	0	40.00
Trumbull Creek	644.00	10.00	654.00
Gangner (Lost) (Spring) Creek	284.00	0	284.00
Spring	90.00	0	90.00
Well or Sump	78.00	0	78.00
Well	5.00	0	5.00
Well	50.00	0	50.00
2 Wells	112.00	0	112.00
Well	80.00	75.00	155.00
Well	1.00	0	1.00
Well	53.00	0	53.00
Well	5.00	0	5.00
Well	18.00	0	18.00
Pond	56.00	0	56.00
Well	3.00	0	3.00
Well	73.00	0	73.00
Well	22.00	0	22.00
Well	99.00	0	99.00
Well	91.00	0	91.00
Spring	81.00	25.00	106.00
Well	2.00	0	2.00
Well	0	10.00	10.00
Well	3.00	0	3.00

IRRIGATION SUMMARY OF FLATHEAD COUNTY BY RIVER BASINS

RIVER BASIN—(Continued)	Present Irrigated Acres	Irrigable Acres Under Present Facilities	Maximum Irrigable Acres
Unnamed Slough	0	0	0
Well	25.00	0	25.00
Well	23.00	3.00	26.00
Total Stillwater River and Tributaries	**11,161.00**	**768.00**	**11,929.00**
Well	1.00	0	1.00
Bradley Channel	22.00	0	22.00
Well	183.00	61.00	244.00
Well	5.00	0	5.00
Ashley Creek	3,813.58	670.40	4,483.99
Middle Ashley Lake	56.00	0	56.00
West Branch Ashley (Meadow) Creek	0	50.00	50.00
Mount Creek	296.00	0	296.00
Riley Creek	194.00	0	194.00
Little Deer (West Bowser) Creek	49.00	130.00	179.00
Hadsel (Boorman) Creek	39.00	0	39.00
Weberg Creek	54.00	0	54.00
Little Lost Creek	53.00	15.00	68.00
Smiths Spring Creek	350.00	0	350.00
Branch of Smith Spring Creek	8.00	0	8.00
Big Lost (O'Neil) Creek	415.00	39.00	454.00
Browns Creek	48.00	0	48.00
Rhodes Creek	7.00	0	7.00
Spring	5.00	0	5.00
Bowser Spring Creek	910.00	46.00	956.00
Unnamed Creek	0	0	0
Pond	87.00	0	87.00
Unnamed Creek	3.00	0	3.00
Well	3.00	0	3.00
Unnamed Creek	0	0	0
Foy Lake	160.00	0	160.00
Middle Foy Lake	16.00	26.00	42.00
Well	26.00	0	26.00
Patrick (Deer) (Ingalls) (Spring) Creek	226.00	134.00	360.00
Bowland Spring (Jones) Creek	1.00	1.00	2.00
McCormack Slough	18.00	18.00	36.00
Wileys (Schoolhouse) Slough	143.00	10.00	153.00
Total Ashley Creek and Tributaries	**6,980.58**	**1,139.40**	**8,119.99**
Half Moon Slough	141.00	0	141.00
Egan Slough	61.00	0	61.00
Well	2.00	0	2.00
Church Slough	90.00	0	90.00
Unnamed Creek	77.00	0	77.00
Mill Creek	244.00	0	244.00
Bartells (Trail) Creek	24.00	0	24.00
Well	32.00	0	32.00
Browns (Mountain Brook) (Smith) Creek	33.00	0	33.00
Spring	3.00	0	3.00
Peters Creek	7.00	0	7.00
Well	43.00	0	43.00

IRRIGATION SUMMARY OF FLATHEAD COUNTY BY RIVER BASINS

RIVER BASIN—(Continued)	Present Irrigated Acres	Irrigable Acres Under Present Facilities	Maximum Irrigable Acres
Well	2.00	0	2.00
Blaine Creek	350.00	0	350.00
Mooring (Upper Blaine)			
(Lake Blaine) Creek	26.00	0	26.00
Lerch Creek	3.00	0	3.00
Well	1.00	0	1.00
Spring	13.00	0	13.00
Lake (Mooring Slough)	121.00	0	121.00
Well	4.00	0	4.00
Lost (Browns) Creek	11.00	0	11.00
Spring	2.00	0	2.00
Lake Blaine	0	0	0
Hemler Creek	0	0	0
South Hemler Creek	15.00	0	15.00
Well	0	11.00	11.00
Well	186.00	27.00	213.00
Well	2.00	0	2.00
Well	17.00	0	17.00
O'Connor (Mill) Creek	6.00	0	6.00
Rose (Therriaults) Creek	61.00	56.00	117.00
Pudro (Cummings) Creek	46.00	0	46.00
Well	1.00	0	1.00
Spring	71.00	0	71.00
Well	1.00	0	1.00
Well	2.00	0	2.00
Well	8.00	0	8.00
Slough	46.00	0	46.00
Spring	9.00	0	9.00
Fennon Slough	75.00	0	75.00
Swims Creek	287.00	10.00	297.00
Echo Lake	0	0	0
Olson Creek	5.00	0	5.00
Peter Sutter & Jacob Gibson Springs	1.00	0	1.00
Cherry (Echo) Creek	0	32.00	32.00
Krause Creek	28.00	0	28.00
Johnson Lakes	36.00	0	36.00
Well	4.00	0	4.00
Slough	95.00	0	95.00
Clark Lake	120.00	0	120.00
Flathead Lake	262.00	0	262.00
Blasdel Ponds	0	100.00	100.00
Altenburg Slough	0	0	0
Pond	2.00	0	2.00
McAffee Slough	53.00	17.00	70.00
Swan River	87.00	25.00	112.00
Wolf Creek	24.00	0	24.00
Mud Creek	0	0	0
Mud Lake	11.00	206.00	217.00
Well	1.00	0	1.00

IRRIGATION SUMMARY OF FLATHEAD COUNTY BY RIVER BASINS

RIVER BASIN—(Continued)	Present Irrigated Acres	Irrigable Acres Under Present Facilities	Maximum Irrigable Acres
Well	2.00	0	2.00
Total Swan River and Tributaries	**125.00**	**231.00**	**356.00**
Little (Cramers Spring) (First) Creek	0	0	0
Unnamed Creek	0	0	0
Christensen Springs	10.00	0	10.00
Spring	2.00	0	2.00
Spring	5.00	0	5.00
Big (Stoner) Creek	24.00	0	24.00
Spring	2.00	0	2.00
Little Bitterroot River	0	0	0
Little Bitterroot Lake	0	0	0
Unnamed Creek	10.00	38.00	48.00
Unnamed Creek	176.00	0	176.00
Unnamed Creek	233.00	0	233.00
Sullivan Creek	10.00	13.00	23.00
Crazy Creek	158.00	0	158.00
Deep (Cromwell) Creek	0	0	0
Vinson (Dip) Creek	8.00	0	8.00
Big Creek	0	60.00	60.00
Sullivan Springs	61.00	0	61.00
Total Little Bitterroot and Tributaries	**656.00**	**111.00**	**767.00**
Total Flathead River and Tributaries	**24,698.58**	**2,829.40**	**27,527.99**
Thompson River	7.00	0	7.00
McGregor Creek	410.00	0	410.00
McGregor Lake	0	0	0
Greenwood Spring Creek	0	0	0
Spring	24.00	0	24.00
Total Thompson River and Tributaries	**441.00**	**0**	**441.00**
Grand Total Columbia River and Tributaries—Flathead County	**27,725.58**	**2,829.40**	**30,554.99**

ASHLEY IRRIGATION DISTRICT

HISTORY

This irrigation project had its beginning in the year of 1897, when a group of farmers organized and established the Ashley Lake Irrigating Company. These men in their spare time constructed a diversion dam and ditch on Ashley Creek and in return for their labor, stock was issued to them in the company. Two water rights were filed on Ashley Creek for the Ashley Lake Irrigating Company by the water users under the project. The appropriators of water were: Walter P. Jaquette, George D. Hahn, Edmund L. Kelley, John Blose, Robert Nordtome, Milan Conant, William M. Thurman, Christofer C. Asher, George M. Fisher, James O'Boyle, Richard Asher, John Eisenhower, David A. Carpenter and Eugene E. Kelley.

In 1909, with the passage of the Irrigation District Law, steps were taken to organize the Ashley Irrigation District. On December 8, 1909, the District Court approved the issuance of $50,000 in bonds by the Commissioners of the district to be used for the purpose of purchasing the irrigation system, works and property of the Ashley Lake Irrigating Company.

The Ashley Irrigation District throughout the intervening years has floated four bond issues, and numerous repairs and improvements have been made to the system, but on each bond issue the costs have increased to the farmers in the district. As of the present date the Ashley Irrigation District has no bond indebtedness.

The head gate and location of the present Ashley Irrigation District Canal was obtained by the district through an agreement with the successors in interest of a prior water right and ditch diversion owned by N. P. Lagoni, Isabella Hartt, David A. Carpenter and I. L. Flinchpaugh. This agreement allows the successors in interest of the prior appropriation of water by Lagoni, Hartt, Carpenter and Flinchpaugh the right to carry 12.5 c.f.s. of their water from Ashley Creek through the district's canal in exchange for the original head gate and ditch.

PRESENT STATISTICS

Location: Ashley Lake is located in Sections 5 and 6 T. 28N., R. 23W., and Sections 1, 2, 10, 11, 12, 14, 15, 22 and 23 T. 28N., R. 24W. Storage water is released from the lake into Ashley Creek where it is divetred by the Ashley Irrigation District Canal in the NW¼NW¼ Section 21 T. 28N., R. 22W. Lands irrigated are located in T. 28N., R. 21W., T. 28N., R. 22W, T. 29N., R. 22W.

Length and Capacity of Canal: The district's canal is 11.75 miles long and has a capacity of 75 c.f.s.

Reservoirs: The surface area of Ashley Lake is 2,445 acres and has a usable storage capacity of approximately 10,000 acre-feet.

Operation and Maintenance: The total water charges under the district in 1964 were $4.50 per acre per year which included operation and maintenance. This water charge may vary from year to year.

Present Users: There were 48 water users in the district in 1964.

Acreage Irrigated: In 1964 there were 2,658.588 acres irrigated by the Ashley Irrigation District with a potential of 414.40 acres and a maximum of 3,072.988 acres.

WATER RIGHT DATA

The Ashley Irrigation District has the following water rights:

An appropriation by the Ashley Irrigation District from Ashley Creek, dated 8-15-10 for 5,000 miner's inches. (Ref. Book 71 Water Rights, page 426, Flathead County.)

An appropriation by the Ashley Irrigation District from Ashley Lake, dated 8-15-10 for 20,000 miner's inches. (Ref. Book 71 Water Rights, page 425, Flathead County.)

Also the two water right filings aequired from the Ashley Lake Irrigating Company appropriated by Walter P. Jaquette, George D. Hahn, Edmund L. Kelley, John Blose, Robert Nordtome, Milan Conant, William M. Thurman, Christofer C. Asher, George M. Fisher, James O'Boyle, Richard Asher, John Eisenhower, David A. Carpenter and Eugene E. Kelley from Ashley Creek, dated 3-6-97 for 5,000 miner's inches, (Ref. Book 16 Water Rights, page 312, Flathead County) and dated 2-1-97 for 20,000 miner's inches. (Ref. Book 16 Water Rights, page 313, Flathead County.)

WATER RIGHT DATA—FLATHEAD COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
COLUMBIA RIVER BASIN							
***Columbia River**	0	0	0				
Kootenai (Kootenay) River	0	0	0				
Tobacco River	0	0	0				
Fortine Creek	0	0	0				
Lime Creek	1	All	---				
Fisher River	0	0	0				
Loon Lake	0	0	0				
Pleasant Valley Fisher River	3	1,300.00	32.50				
Pearson Creek	1	960.00	24.00				
Hammond Creek	2	350.00	8.75				
Dry (Fisher) Creek	2	360.00	9.00				
Bear Spring	1	200.00	5.00				
Jakes Spring	1	100.00	2.50				
Johnson Creek	1	40.00	1.00				
Unnamed Spring	1	All	---				
Markus Creek	3	700.00	17.50				
Careful Creek	2	4,000.00	100.00				
Careless Creek	3	2,800.00	70.00				
Pleasant Valley (Meadow) Cr.	4	800.00	20.00				
Pine (Elbow) Creek	2	550.00	13.75				
Willow (Nolan) Creek	1	300.00	7.50				
Spring	0	0	0				
Island Creek	1	All	---				
Total Kootenai River and Tributaries	29	12,460.00	311.50				
Clark Fork of Columbia River	0	0	0				
Flathead River	42	3,127,000.00	78,175.00				
Colts Creek	0	0	0				
Clute Creek	1	800.00	20.00				
Yakinikak (Trail) Creek	2	200.00	5.00				
Ketchikan Creek	3	720.00	18.00				
Johnson Creek	2	240.00	6.00				
Spring Creek	1	All	---				
Tepee Creek	1	All	---				
Spring Creek	1	400.00	10.00				
Whale Creek	1	All	---				
Moose Creek	2	400.00	10.00				
Spring Creek	1	40.00	1.00				
Hawk Creek	3	720.00	18.00				
Spruce (Red Meadow) Creek	3	400.00	10.00				
So. Fork Spruce Creek	1	160.00	4.00				
Indian Creek	3	4,200.00	105.00				
Long Bow Creek	4	16,000.00	400.00				
Spring	1	25.00	.63				

*Names of streams indented on the left-hand margin indicate that they are tributaries of the first stream named above which is not indented.

WATER RIGHT DATA—FLATHEAD COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
Bowman Creek	1	20,000.00	500.00				
Unnamed Creek	1	5.00	.13				
Charleys Creek	1	80.00	2.00				
Spring	1	160.00	4.00				
Hay Creek	5	20,000.00	500.00				
Moran (Beaver) Cr.	1	1,000.00	25.00				
Quartz Creek	3	101,300.00	2,532.50				
Banking (Hague) (Tulley) Creek	3	53,504.00	1,337.60				
Coal Creek	5	48,000.00	1,200.00				
So. Fork Coal Cr.	1	2,000.00	50.00				
Cyclone Creek	2	50.00	1.25				
Cyclone (Devill) Lake	1	50,000.00	1,250.00				
Jessie Creek	1	20,000.00	500.00				
Spring Creek	2	300.00	7.50				
Logging Creek	2	24,000.00	600.00				
Camas Creek	0	0	0				
Dutch Creek	1	114.00	2.85				
Big Creek	0	0	0				
Canal (Longford) Creek	1	10,000.00	250.00				
Canyon Creek	1	40.00	1.00				
So. Fork Canyon Creek	3	9,000.00	225.00				
Middle Fork Flathead River	4	4,280.00	107.00				
Bear Creek	8	3,432.00	85.80				
Paynes Gulch	1	1,000.00	25.00				
Unnamed Creek	1	80.00	2.00				
Giefer Creek	1	720.00	18.00				
West Fork Giefer Creek	1	160.00	4.00				
Spring	1	10.00	.25				
Unnamed Stream	2	40.40	1.01				
Falls Creek	1	1,000.00	25.00				
Deer Creek	1	200.00	5.00				
Unnamed Creek	1	All	---				
Spring	1	All	---				
Essex Creek	1	6 in. Pipe	---				
Spring	2	50.00	1.25				
Spring	3	96.00	2.40				
Spring	3	40.00	1.00				
Dickey Creek	4	8,340.00	208.50				
Paola (Pinnacle) Creek	1	200.00	5.00				
Forhan Spring	2	1,600.00	40.00				
Spring	2	20.00	.50				
Culvert (Tunnell) (Mitchell) Creek	3	2,440.00	61.00				
Forest Creek	1	400.00	10.00				
Stanton Creek	2	8,120.00	203.00				
Sawmill (Spring) Creek	1	400.00	10.00				
Coal Creek	1	All	---				
Skiumah Creek	3	804.00	20.10				
Spring	1	4.00	0.10				
Great Bear Creek	1	1,000.00	25.00				
Nyack Creek	2	All	---				
Deer Lick Creek	5	2,880.00	72.00				

WATER RIGHT DATA—FLATHEAD COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
Kootenai Creek	1	120.00	3.00				
Spring	1	20.00	.50				
Nelson (Beelar) Creek	3	510.00	12.75				
Belton Spring	9	313.00	7.83				
McDonald Creek	5	52,000.00	1,300.00				
North Fork McDonald Cr.	1	2,000.00	50.00				
Middle Fk. No. Fk. McDon. Cr.	1	450.00	11.25				
South Fork McMcDonald Cr.	1	1,000.00	25.00				
Lake McDonald	1	200,000.00	5,000.00				
Kelley Creek	1	8.00	0.20				
Unnamed Creek	5	10.00	0.25				
Snyder Creek	1	3.92	0.10				
Sawmill Cr.	1	3.00	0.08				
Sprague Creek	1	16,000.00	400.00				
Apgar Creek	4	340.00	8.50				
Rubidoux Creek	1	51.20	1.28				
Hamilton Creek	1	40.00	1.00				
Unnamed Creek	0	0	0				
Lake Five	1	7 A. F.	---				
Roberts Coulee	1	280.00	7.00				
Spring	1	60.00	1.50				
Unnamed Creek	1	40.00	1.00				
Spring Creek	1	40.00	1.00				
Spring	1	4.00	0.10				
Ross Tway Lake	1	---	---				
Spring (Tunnell) Cr.	2	700.00	17.50				
Hellman Springs & Creek	1	400.00	10.00				
Unnamed Creek	1	400.00	10.00				
Blue Spring Creek	1	4.00	0.10				
Clearwater Creek	2	150.00	3.75				
Spring	1	8.00	0.20				
Coram Creek	1	300.00	7.50				
Spring Creek	5	440.00	11.00				
Lake	1	240.00	6.00				
Spring	1	40.00	1.00				
Spring	1	40.00	1.00				
Abbott (Martin) (Gold) (E. Fk.) (N. Abbott) Creek	10	12,420.00	310.50				
Unnamed Creek	1	100.00	2.50				
South Abbott (Smith) Creek	4	140.00	3.50				
Spring	2	80.00	2.00				
Unnamed Creek	1	All	---				
South Fork Flathead River	4	280,000.00	7,000.00				
Coal Creek	1	4,000.00	100.00				
Murray Creek	1	200.00	5.00				
Frank Creek	1	400.00	10.00				
Whelp Creek	0	0	0				
Lion Lake	1	120.00	3.00				
Spring	2	40.00	1.00				
Sand Creek	1	---	---				
Well	0	0	0				

WATER RIGHT DATA—FLATHEAD COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
Heller Creek	2	400.00	10.00				
Springs	2	1,000.00	25.00				
Butcher Creek	3	2,100.00	52.50				
Opalka Creek	1	500 gpm	---				
Cooper Creek	1	25.00	0.63				
Mengan Creek	3	720.00	18.00				
Spring	1	500.00	12.50				
Stanley Creek	6	1,800.00	45.00				
Spring	1	40,000.00	1,000.00				
Cedar (Crystal) (Bad Rock Canyon) (Trout) Creek	16	17,981.00	449.53				
Unnamed Creek	1	120.00	3.00				
Hamilton Creek	1	40.00	1.00				
Spring	1	120.00	3.00				
Spring	2	400.00	10.00				
Studt Creek	1	120.00	3.00				
Snow Creek	1	100.00	2.50				
Well	2	268 gpm	.60				
Well	1	100 gpm	.20				
Well	2	20 gpm	.04				
Spring	1	10.00	0.25				
Spring	1	20.00	0.50				
Spring	1	80.00	2.00				
Well	1	320 gpm	.71				
Pressentine Slough	1	100.00	2.50				
Unnamed Slough	1	100.00	2.50				
Well	2	1300 gpm	2.90				
Everly Lake Creek	1	80.00	2.00				
Lake Everly	6	1,315.00	32.88				
Spring	1	20.00	0.50				
Well	1	15 gpm	.33				
Muskrat Lake	2	480.00	12.00				
Well	1	3000 gph	.11				
Stillwater River	77	414,513.00	10,362.83				
Lost Creek	1	60.00	1.50				
Sunday Creek	2	80.00	2.00				
Spring Creek	2	20,080.00	502.00				
(Jack) Martin Creek	1	40.00	1.00				
Dog Creek	2	200.00	5.00				
Meadow Lake Cr.	1	All	---				
Spring Creek	1	- -	---				
Unnamed Creek	1	40.00	1.00				
Lower Stillwater Lake	3	72,000.00	1,800.00				
Mid'le Fk. Stillwater River (Good Cr.)	3	5,020.00	125.50				
Miller Creek	1	840.00	21.00				
Shattuck Creek	1	120.00	3.00				
So. Fk. Still. River (Logan Cr.)	7	65,785.00	1,644.63				
Griffin Creek	2	8,080.00	202.00				
Sullivan Cr.	1	40.00	1.00				
W. Fk. So. Fk. Stillwater (Sheppard Cr.)	1	200.00	5.00				
Sanko Creek	1	20.00	0.50				
Talley Lake	3	160,000.00	4,000.00				
Evers Creek	1	80.00	2.00				

WATER RIGHT DATA—FLATHEAD COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
Unnamed Creek	0	0	0				
Boyle (Loon) Lake	0	0	0				
Springs	1	240.00	6.00				
Tamarack Creek	2	200.00	5.00				
Mud Creek	1	40.00	1.00				
Bootjack Lake	3	500.00	12.50				
Outlet of Bootjack Lake	5	6,500.00	162.50				
Unnamed Creek (Outlet to Spencer Lake)	1	--	---				
Spencer Lake	1	All	---				
Skyles Lake outlet	2	240.00	6.00				
Spring	1	40.00	1.00				
Spring	3	520.00	13.00				
Bear (Tobie) (Bissel Moore) Creek	7	320.00	8.00				
Burton Springs	1	5.00	0.13				
Twin Lakes	1	120.00	3.00				
North Lost (Little Lost) Creek	11	3,140.00	78.50				
Springs	1	100.00	2.50				
Lost (Love) Lake	4	9,080.00	227.00				
Spring	1	All	---				
Spring	1	100.00	2.50				
Merton Spring Cr.	3	900.00	22.50				
Spring	1	100.00	2.50				
Moon Lake	2	29.00	0.73				
Horntvedt Lake	1	100.00	2.50				
Barta Lake	7	540.00	13.50				
Spring	1	2,000.00	50.00				
White Crystal Sp'g	1	All	---				
Whitefish River	63	913,323.20	22,833.08				
Whitefish Lake	2	400.00	10.00				
Lazy Creek	0	0	0				
Spring Creek	1	80.00	2.00				
Jacobson Sp'g	1	All	---				
Smith Creek	3	280.00	7.00				
Spring	1	All	---				
Third (Collins) Creek	1	160.00	4.00				
Hellroaring Cr.	2	1,300.00	32.50				
Eagle Creek	3	320.00	8.00				
Spring	1	All	---				
Crystal Spring (Reeves Cr.)	1	200.00	5.00				
Quenton Creek	1	All	---				
Ritter Spring	1	All	---				
Jensen Spring	1	All	---				
Spring	1	100.00	2.50				
Spring	1	120.00	3.00				
Snyder Creek	2	280.00	7.00				
Unnamed Cr.	1	40.00	1.00				
Spring	1	800.00	20.00				
Unnamed Creek	1	40.00	1.00				
Spring	1	40.00	1.00				
Springs	1	All	---				
Well	1	50 gpm	.11				

WATER RIGHT DATA—FLATHEAD COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
Nigger Lake	1	80.00	2.00				
Butlers Creek	1	200.00	5.00				
Haskill (Cedar) (Second) Creek	15	4,448.00	111.20				
First (Walker) Cr.	4	2,532.00	63.30				
Sampson Lake	1	4,000.00	100.00				
Motichka Creek	2	70.00	1.75				
Well	1	2,000 gpm	4.46				
Blanchard Lake	2	400.00	10.00				
Joyces Lake	1	40.00	1.00				
Well	5	887.5 gpm	1.98				
Total Whitefish River and Tributaries	**125**	**929,253.20**	**23,237.88**				
Spring (East Spring) Creek	22	12,195.00	304.88				
Well	1	200.00	5.00				
Well	1	400 gpm	.89				
Trumbull Creek	23	36,614.00	915.35				
Gangner (Lost) (Sp'g) Cr.	17	15,540.00	388.50				
Lost Creek	1	5,000.00	125.00				
Spring	1	All	---				
Well or Sump	2	160.00	4.00				
Well	1	400 gpm	.89				
Well	1	86.00	2.15				
2 Wells	1	All	---				
Well	1	1200 gpm	2.68				
Spring	1	80.00	2.00				
Well	1	20 gpm	.04				
Slough	1	200.00	5.00				
Well	3	820 gpm	1.83				
Spring	1	120.00	3.00				
Well	7	7700 gpm	17.18				
Unnamed Slough	2	240.00	6.00				
Well	1	1000 gpm	2.23				
Dry Coulee	1	8.00	0.20				
Total Stillwater River and Tributaries	**390**	**1,771,708.20**	**44,325.21**				
Slough	1	All	---				
Unnamed Slough	2	All	---				
Well	1	20 gpm	.04				
Bradley Channel	1	80.00	2.00				
Unnamed Slough	1	449,000.00	11,225.00				
Ashley Creek	58	52,370.00	1,309.25				
Ashley Lake	1	20,000.00	500.00				
Spring	1	40.00	1.00				
Rand (Talley) Cr.	3	1,120.00	28.00				
Middle Ashley Lake	1	80.00	2.00				
West Branch Ashley (Meadow) Cr.	3	480.00	12.00				
Spring Creek	2	700.00	17.50				
Spring	1	All	---				
Rogers Creek	1	13.30	0.33				
Rogers Lake	2	500.00	12.50				
Spring	1	40.00	1.00				
Hunt Creek	1	500.00	12.50				
Mount Creek	4	1,300.00	32.50				
Daggett Creek	1	80.00	2.00				

WATER RIGHT DATA—FLATHEAD COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
Indian Creek	2	480.00	12.00				
Riley Creek	1	600.00	15.00				
Hodgson Creek	1	160.00	4.00				
Spring	1	All	---				
Pool Spring	1	40.00	1.00				
Truman (Deer) (Tripp) Creek	9	6,440.00	161.00				
Emmons Creek	2	60.00	1.50				
So. Fk. Truman (Wild Bill) Cr.	3	265.00	1.50 6.63				
Wilson Creek and Spring	1	80.00	2.00				
Smith Lake	0	0	0				
Dry Creek	2	400.00	10.00				
Spring	1	All	---				
Spring (Spruce) Creek	5	344.00	8.60				
Spring	1	144.00	3.60				
Hoffman Draw (Little Lost Cr.)	1	80.00	2.00				
Masters Creek	1	100.00	2.50				
Spring	2	80.00	2.00				
Little Deer (West Bowser) Creek	10	3,430.00	85.75	1278	2		Reservoir
Anders Creek	1	250.00	6.25				
Spring	1	All	---				
Spring	1	All	---				
Hadsell (Boorman) Creek	9	2,410.00	60.25				
Weberg Creek	4	412.00	10.30				
Spring	1	200.00	5.00				
Spring	1	All	---				
Unnamed Creek	0	0	0				
Spring	1	20.00	0.50				
Joes (Spring) Cr.	7	3,654.00	91.35				
Spring	1	100.00	2.50				
Unnamed Creek	1	160.00	4.00				
Unnamed Creek	2	140.00	3.50				
Spring	1	50.00	1.25				
Spring	1	40.00	1.00				
Little Lost Creek	11	8,519.00	212.98				
Spring	1	5.00	0.13				
Mountain Creek	1	100.00	2.50				
Smiths Spring Cr.	10	2,220.00	55.50				
Springs, Wells, Ponds	2	170.00	4.25				
Greigs Springs	1	100.00	2.50				
Branch Smith Spring Cr.	1	1½-in. pipe					
Spring	1	All	---				
Big Lost (O'Neil) Creek	18	8,440.00	211.00				
Browns Creek	2	All	---				
Rhodes Creek	1	80.00	2.00				
Spring	1	40.00	1.00				
Bowser Spring Cr.	30	22,869.00	571.73	*9749	12	360.00	9.00
Spring	1	40.00	1.00				

*Ditch Decree

WATER RIGHT DATA—FLATHEAD COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
Unnamed Creek ..	0	0	0				
Pond	1	80.00	2.00				
Unnamed Cr.	1	80.00	2.00				
Well	1	30 gpm	.06				
Unnamed Creek	3	1,075.00	26.88				
Foy Lake	16	3,720.00	93.00				
Middle Foy Lake	5	960.00	24.00				
Lower Foy Lake..	1	500.00	12.50				
Sewage Drain	1	All	---				
Well	1	40.00	1.00				
Springs	1	80.00	2.00				
Springs	1	40.00	1.00				
Well	1	0	0				
Patrick (Deer) (Ingalls) (Spring) Creek	14	3,400.00	85.00				
Spring	1	½ the water					
Bowland Spring (Jones) Creek ..	2	380.00	9.50				
Bowland Sp'g ..	1	300.00	7.50				
Spring	1	120.00	3.00				
Spring	1	All	---				
Spring	1	All	---				
Gregg (Birch) (Spring) (Schumaker Slough) (Lonneau) Cr...	7	1,480.00	37.00				
Spring	1	60.00	1.50				
Spring	1	40.00	1.00				
Spring	1	---	---				
McCormack Slough	3	10 A. F.					
Wileys (Schoolhouse) Slough	5	360.00	9.00				
Total Ashley Creek and Tributaries	**307**	**152,660.30**	**3,816.50**				
Half Moon Slough	1	100.00	2.50				
Unnamed Creek	1	800.00	20.00				
Egan Slough	3	400.00	10.00				
Well	1	100 gpm	.22				
Church Slough	1	---	---				
Unnamed Creek	4	160.00	4.00				
Springs	3	160.00	4.00				
Lane Creek	1	180.00	4.50				
Mill Creek	7	14,700.00	367.50				
Bartells (Trail) Cr...	4	3,050.00	76.25				
Browns (Mountain Brook) (Smith) Creek	2	1,160.00	29.00				
Springs	1	266.00	6.65				
Spring	1	50.00	1.25				
Spring	1	240.00	6.00				
Peters Creek	9	3,200.00	80.00				
Well	1	10,100 gpm	22.54				
Blaine Creek	14	7,390.00	184.75				
Mooring (Upper Blaine) (Lake Blaine) Cr. ..	7	2,325.00	58.13				
Lerch Creek	3	250.00	6.25				
Well	1	50 gpm	.11				

WATER RIGHT DATA—FLATHEAD COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
Spring	1	500.00	12.50				
Spring	1	40.00	1.00				
Bernetts Spring	2	1,040.00	26.00				
Spring	1	40.00	1.00				
Hall Lake	1	80.00	2.00				
Lake (Mooring Slough)	3	240.00	6.00				
Well	1	25 gpm	.05				
Spring Creek	3	450.00	11.25				
Spring	1	50.00	1.25				
Lost (Browns) Creek	2	1,100.00	27.50				
Spring	2	4,000.00	100.00				
Lake Blaine	3	700.00	17.50				
Hemler Creek	4	540.00	13.50				
N. Hemler Cr.	7	110.00	2.75				
S. Hemler Cr.	1	40.00	1.00				
Honeysuckle Spring	1	---	---				
Handkerchief Creek	1	All	---				
Well	4	2,365 gpm	5.28				
O'Conner (Mill) Creek	4	274.00	6.85				
Bellefleur Spring Creek	2	16.50	0.41				
Spring	1	--	---				
Rose (Therriaults) Cr.	2	1,480.00	37.00				
Pudro (Cummings) Creek	2	312.00	7.80				
Well	1	50 gpm	.11				
Spring	1	All	---				
Well	2	35 gpm	.08				
Slough	0	0	0				
Fox (Spring) Creek	2	300.00	7.50				
Fox Spring	3	900.00	22.50				
Spring	1	All	---				
Spring	2	40.00	1.00				
Fennon Slough	3	560.00	14.00				
Swims Creek	2	1,600.00	40.00				
Echo Lake	0	0	0				
Olson Creek	1	200.00	5.00				
Peter Sutter & Jacob Gibson Springs	2	1,250.00	31.25				
Cherry (Echo) Creek	3	190.00	4.75				
Krause Creek	8	760.00	19.00				
Rocky Mountain Spring	2	80.00	2.00				
Johnson Lakes	0	0	0				
Cabin Lake	1	All	---				
Well	1	17 gpm	.04				
Slough	1	80.00	2.00				
Clark Lake	1	1,000 gpm					
Flathead Lake	9	13,780.00	344.50				
Blasdel Ponds	1	125.00	3.13				
Altenburg Slough	2	200.00	5.00				
Pond	0	0	0				

WATER RIGHT DATA—FLATHEAD COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
McAfee Slough	2	40.00	1.00				
Spring	1	2.00	0.05				
Swan River	18	698,260.00	17,456.50				
Patterson Creek	2	700.00	17.50				
Meadow Creek	1	1,000.00	25.00				
Peterson (Deer) Creek	3	140.00	3.50				
South Trib. of Peterson Cr.	1	40.00	1.00				
Bear Creek	1	60.00	1.50				
Wolf Creek	8	2,210.00	55.25				
Mud Creek	1	100.00	2.50				
Mud Lake	1	5 A. F.					
Noisey Creek	2	120.00	3.00				
Rock Creek	1	80.00	2.00				
Station Creek	1	80.00	2.00				
Deer Creek	2	360.00	9.00				
Unnamed Cr.	1	120.00	3.00				
Hopkins Creek	1	200.00	5.00				
Beaver Creek	4	350.00	8.75				
Well	1	50 gpm	.11				
Unnamed Stream	1	10.00	0.25				
Well	1	600 gpm	1.33				
Total Swan River and Tributaries	51	703,830.00	17,597.19				
Little (Cramers Spring) (First) Creek	6	2,480.00	62.00				
Unnamed Creek	1	50.00	1.25				
Christensen Springs	1	80.00	2.00				
Ganzers Branch	2	100.00	2.50				
Spring	1	20.00	0.50				
Spring	1	400.00	10.00				
Big (Stoner) Creek	17	8,820.00	220.50				
Spring	1	35.00	0.88				
Spring	1	80.00	2.00				
1st South Branch (Tachland) Cr.	5	8,080.00	202.00				
Spring	1	16.00	0.40				
So. Fork Big Cr.	1	300.00	7.50				
Unnamed Creek	0	0	0				
Spring	1	40.00	1.00				
Little Bitterroot River	5	160,240.00	4,006.00				
Little Bit'root Lake	0	0	0				
Unnamed Lake	1	---	---				
Unnamed Creek	1	80.00	2.00				
Sickler Creek	1	800.00	20.00				
Spring	1	120.00	3.00				
Holmes Spring	1	40.00	1.00				
Unnamed Creek	2	140.00	3.50				
Unnamed Creek	1	All	---				
Dry Creek	1	144.00	3.60				
No Name Creek	1	All	---				
Spring	1	40.00	1.00				
Sullivan Creek	2	160.00	4.00				
West Branch Sullivan Creek	1	80.00	2.00				
Crazy Creek	1	320.00	8.00				

WATER RIGHT DATA—FLATHEAD COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
Deep (Cromwell) Creek	4	100.00	2.50				
Spring	1	80.00	2.00				
Vinson (Dip) Creek	3	610.00	15.25				
Dry Gulch	3	600.00	15.00				
Radel Spring	1	All	---				
Rock Spring Cr.	1	600.00	15.00				
Spring	1	All	---				
Big Creek	5	1,075.00	26.88				
Pine Spring	1	40.00	1.00				
Willow Sp'gs	1	80.00	2.00				
Spring	3	260.00	6.50				
Unnamed Creek	1	160.00	4.00				
Spring	1	160.00	4.00				
Spring	1	300 gph	---				
Sullivan Springs	1	80.00	2.00				
Lost Spring Cr.	1	40.00	1.00				
Spring	1	All	---				
Spring	1	All	---				
Spring	1	All	---				
Malteen Spring	1	All	---				
Total Little Bitterroot and Tributaries	53	166,049.00	4,151.23				
Thompson River	2	580.00	14.50				
McGregor Creek	3	600.00	15.00				
McGregor Lake	0	0	0				
Greenwood Spring Creek	1	200.00	5.00				
Spring	1	40.00	1.00				
Lang Creek	4	200.00	5.00				
Spring	1	30.00	0.75				
Pinched Out Creek	1	All	---				
Murr Creek	1	400.00	10.00				
Total Thompson River and Tributaries	14	2,050.00	51.25				
Grand Total Flathead County	1,387	7,533,209.52	188,397.45				

DRAINAGES IN FLATHEAD COUNTY NOT LOCATED

STREAM	No. of Filings	Miner's Inches	Cu. Ft. Per Sec.
Little Bear Creek	1	4,000.00	100.00
Big Creek	1	5,000.00	125.00
Columbia Creek	1	400.00	10.00
Deer Creek	2	2,000.00	50.00
Miller Creek	1	100.00	2.50
Morrow Creek	1	300.00	7.50
Otter Creek	1	2,000.00	50.00
Renullard Creek	1	All	
Spring	1	120.00	3.00
Duck Lake	1	500.00	12.50
John Flynn Lake	1	200.00	5.00
Lake Wisdom	1	20,000.00	500.00
Unnamed Lake	1	3,000.00	75.00
Unnamed Creek	1	120.00	3.00
Unnamed Creek	1	2,000.00	50.00
Unnamed Spring	1	500.00	12.50
Total	17	40,240.00	1,006.00

WATER RESOURCES SURVEY

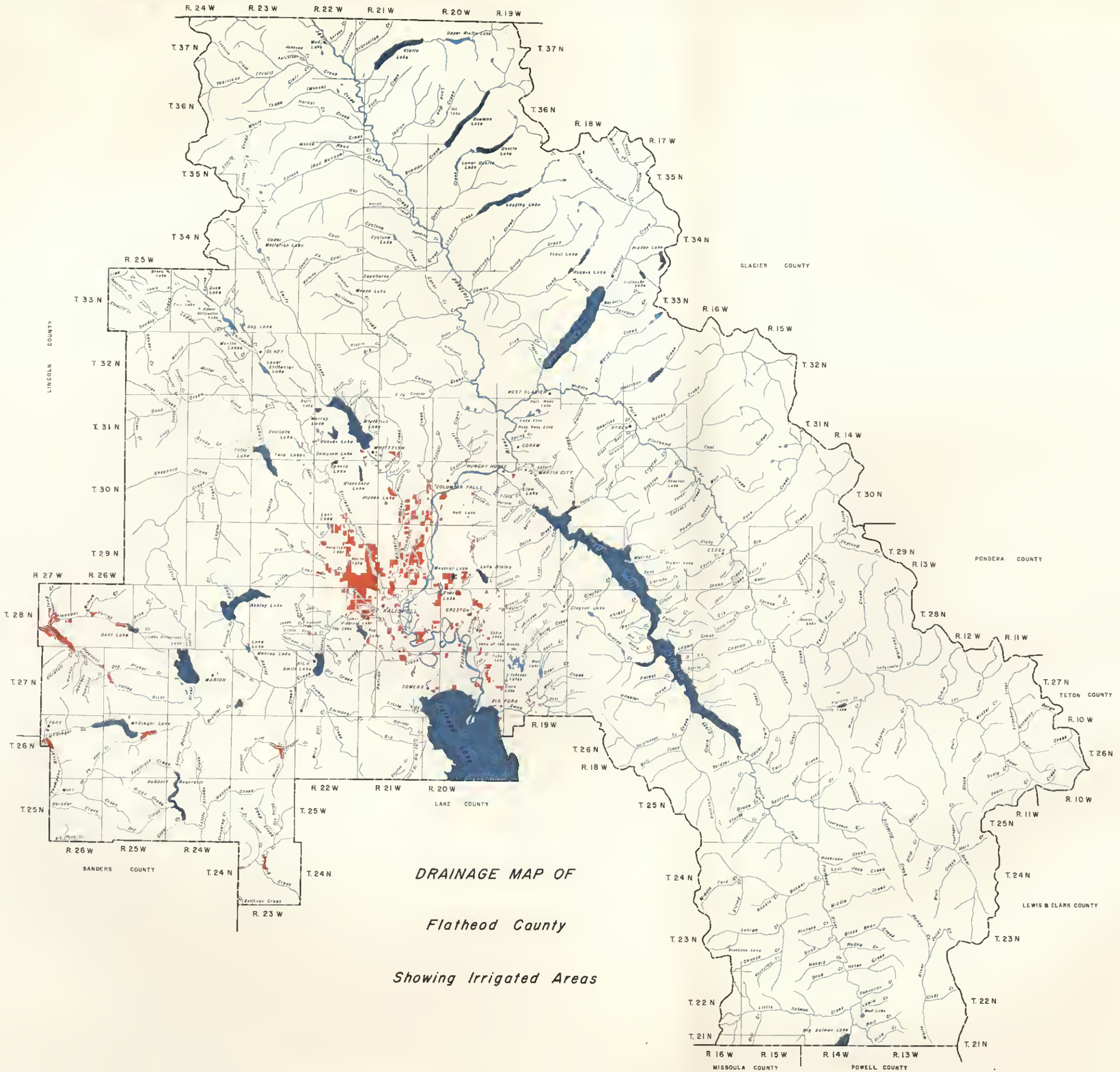
Flathead County, Montana

PART II

Maps Showing Irrigated Areas

Published by
STATE ENGINEER'S OFFICE
Helena, Montana
June, 1965

CANADA BRITISH COLUMBIA



DRAINAGE MAP OF

Flathead County

Showing Irrigated Areas

MAP INDEX

MAP SYMBOL INDEX

BOUNDARIES

- COUNTY LINE
- NATIONAL FOREST LINE

DITCHES

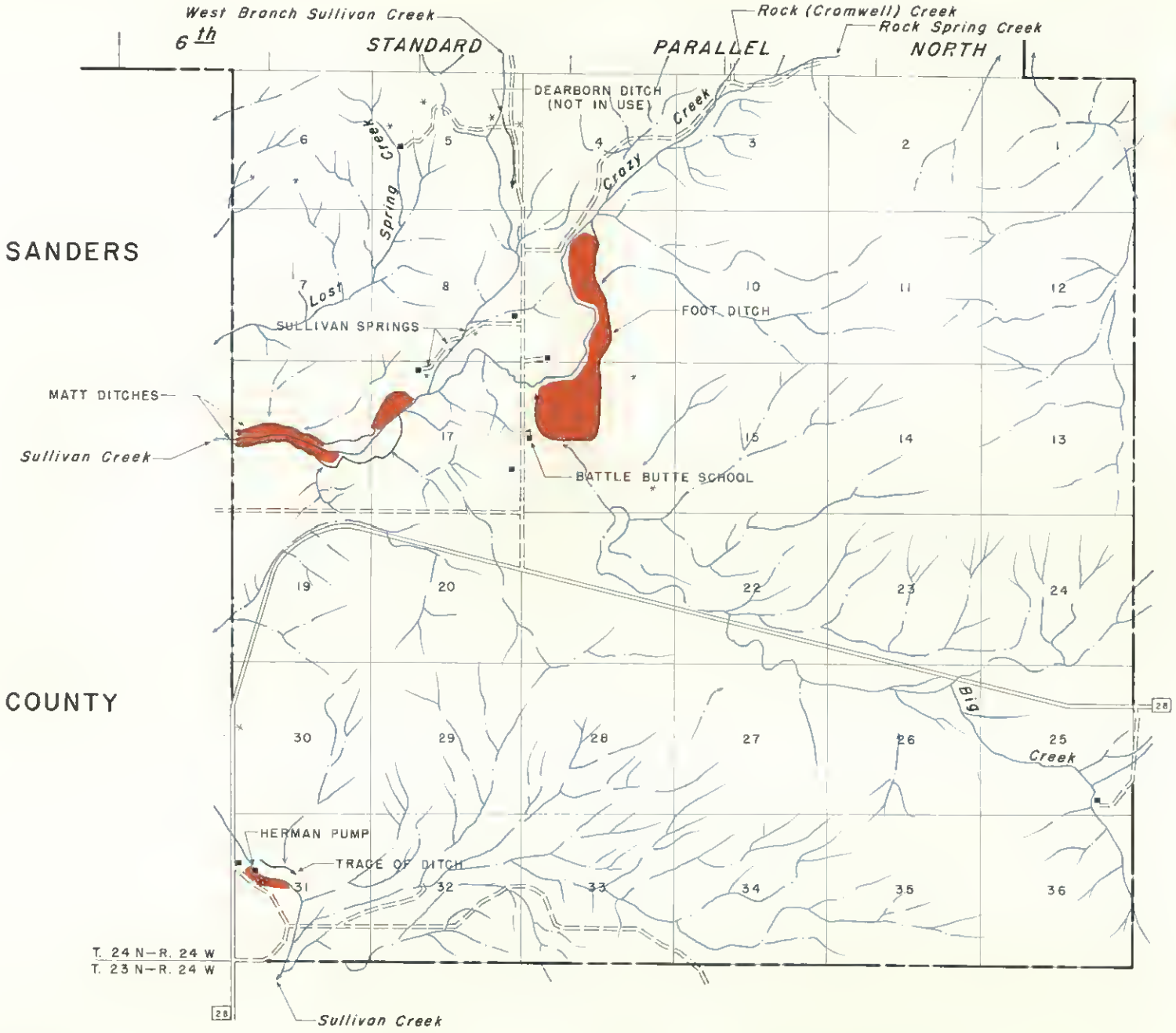
- CANALS OR DITCHES
- DRAIN DITCHES
- PROPOSED DITCHES

TRANSPORTATION

- PAVED ROADS
- UNPAVED ROADS
- RAILROADS
- STATE HIGHWAY
- U.S. HIGHWAY
- AIRPORT

STRUCTURES & UNITS

- DAM
- DIKE
- FLUME
- SIPHON
- SPILL
- SPRINKLER SYSTEM
- WEIR
- PIPE LINE
- PUMP
- PUMP SITE
- RESERVOIR
- WELL
- NATURAL CARRIER USED AS DITCH
- SPRING
- SWAMP
- GAUGING STATION
- POWER PLANT
- STORAGE TANK
- CEMETERY
- FAIRGROUND
- FARM OR RANCH UNIT
- LOOKOUT STATION
- RANGER STATION
- RAILROAD TUNNEL
- SCHOOL
- SHAFT, MINE, OR DRIFT

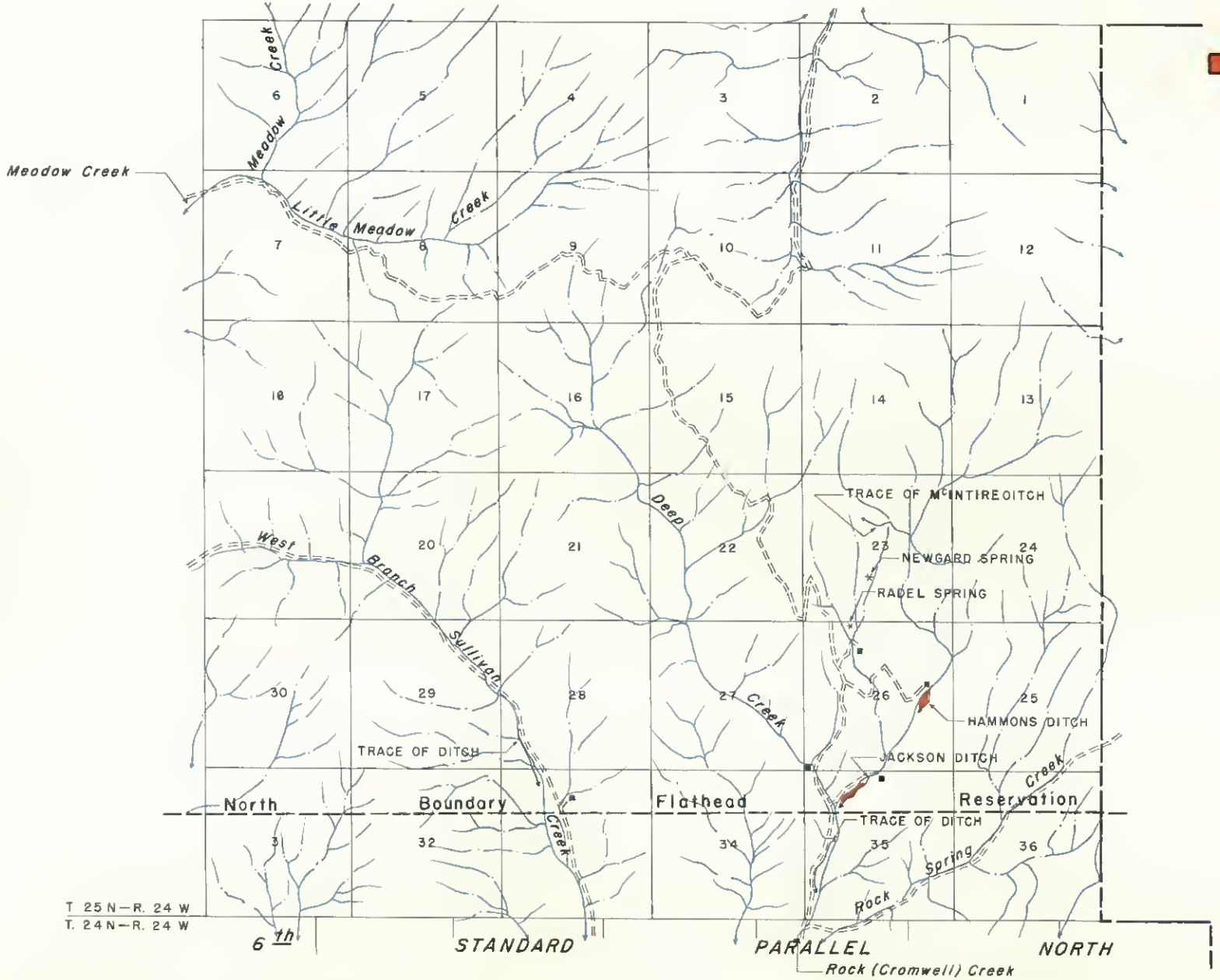


LEGEND

Private Irrigation

Twp. 24 North

Rge. 23 West



LEGEND

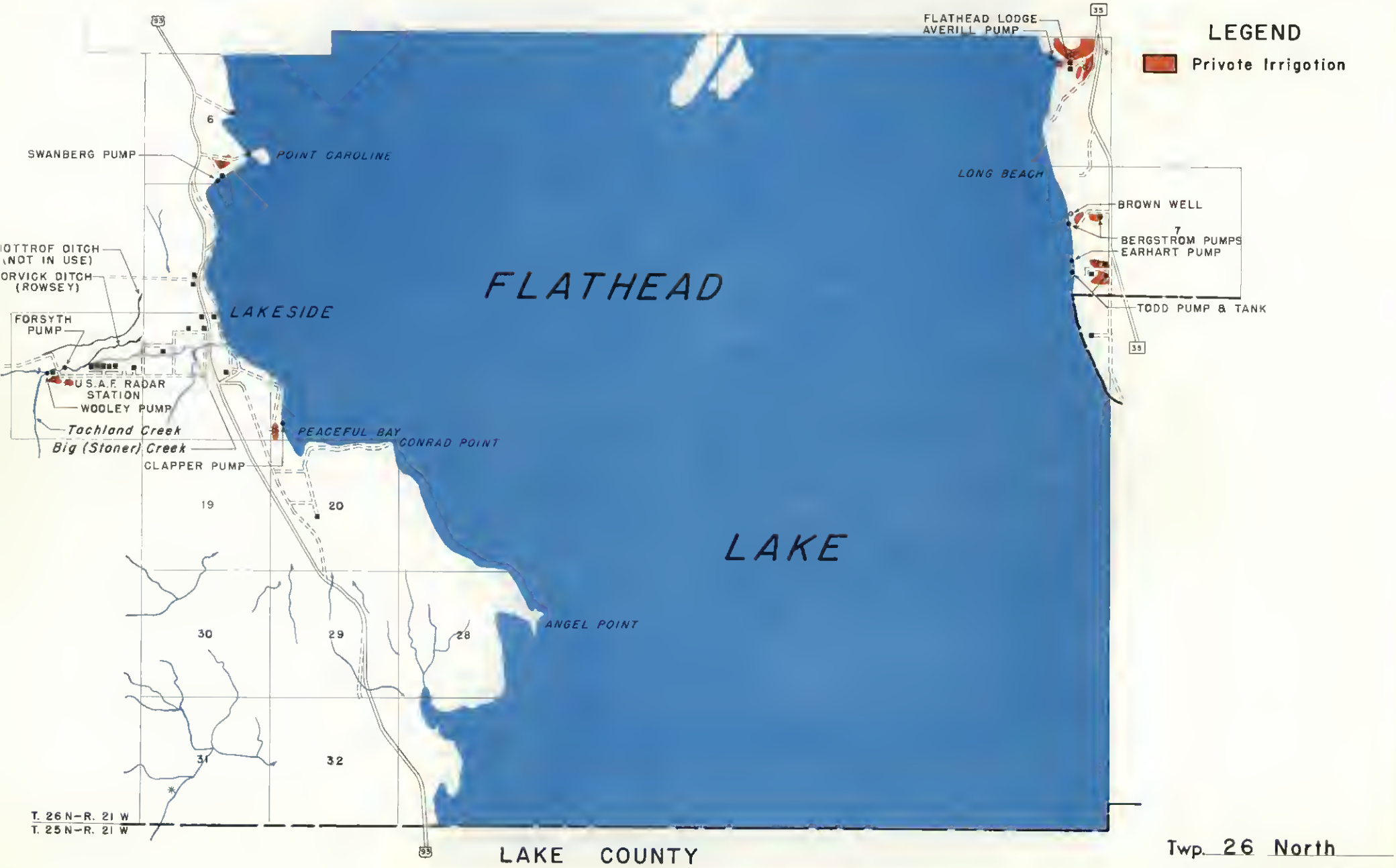
Private Irrigation

LAKE

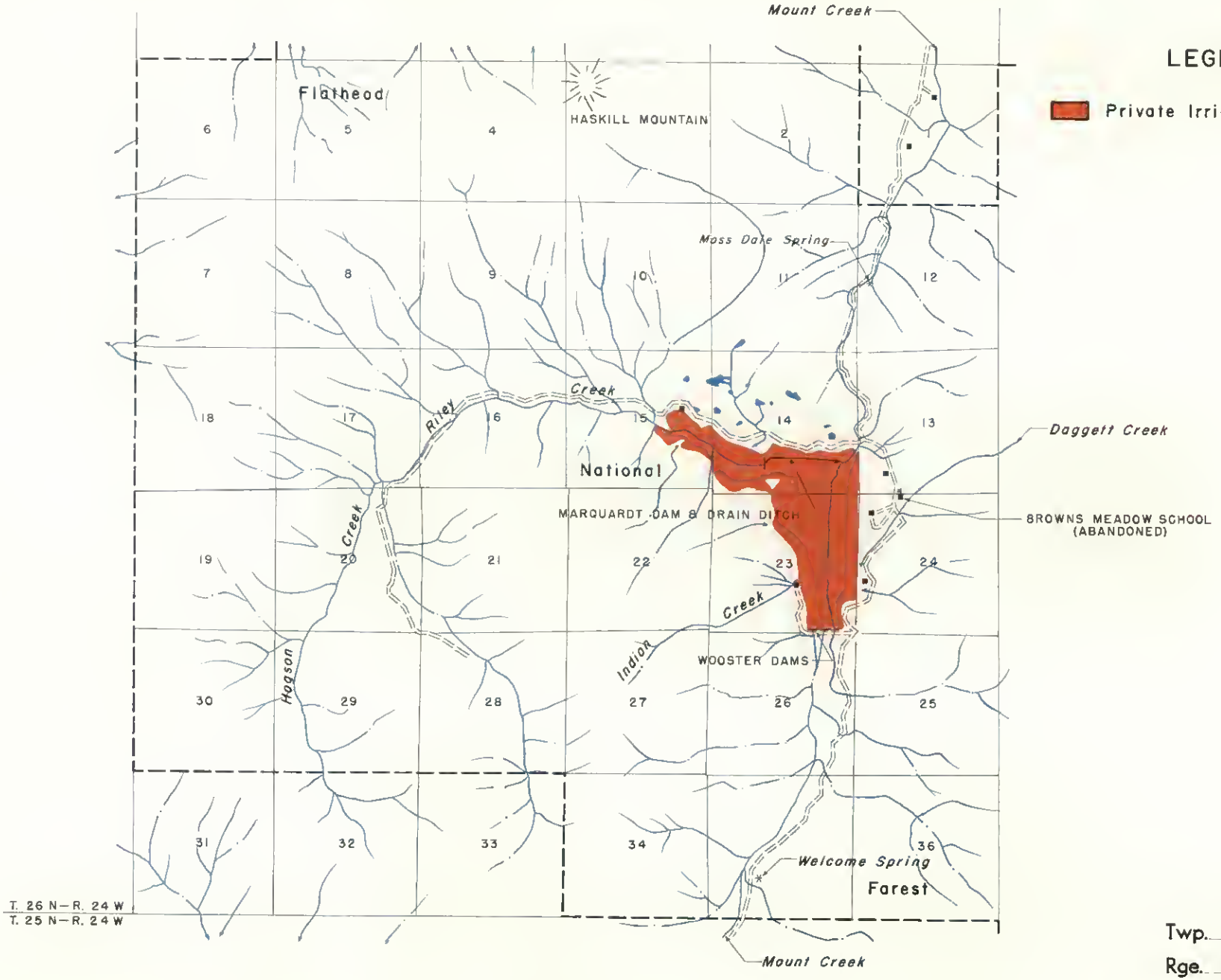
COUNTY

Twp. 25 North

Rge. 23 West



Twp. 26 North
Rge. 19, 20 & 21 West

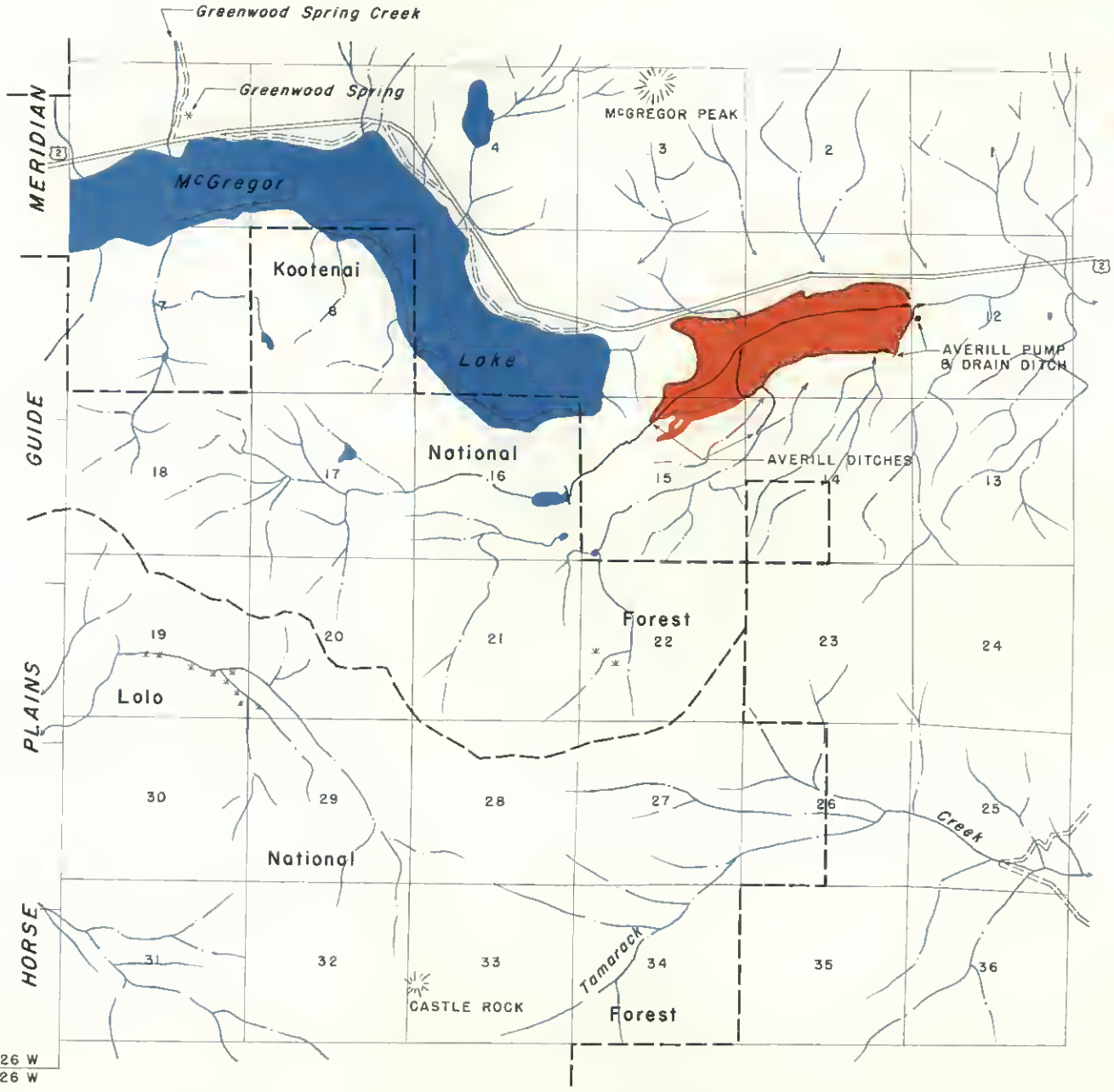


LEGEND

Private Irrigation

Twp. 26 North

Rge. 23 West

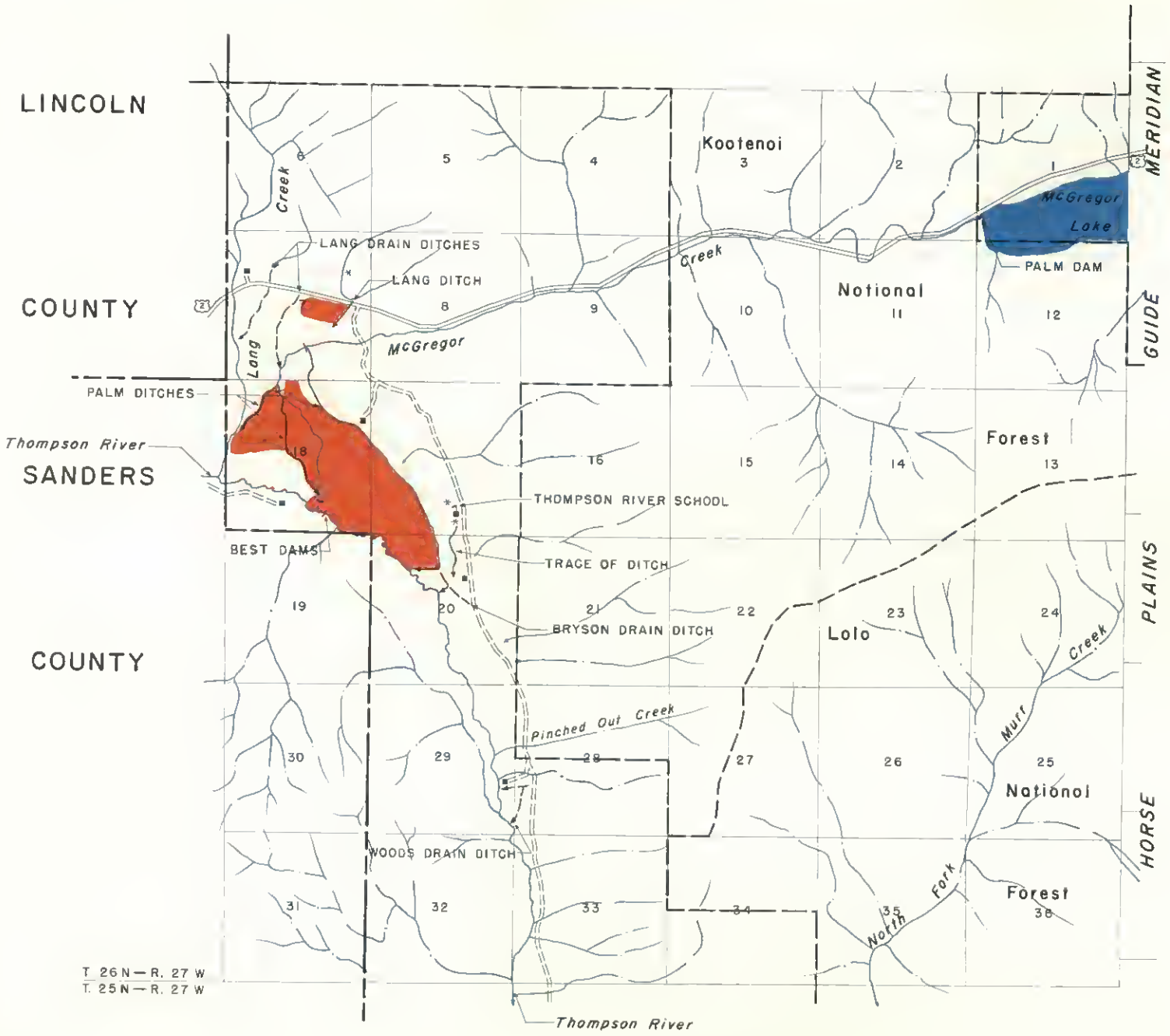


LEGEND

Private Irrigation

Twp. 26 North

Rge. 25 West

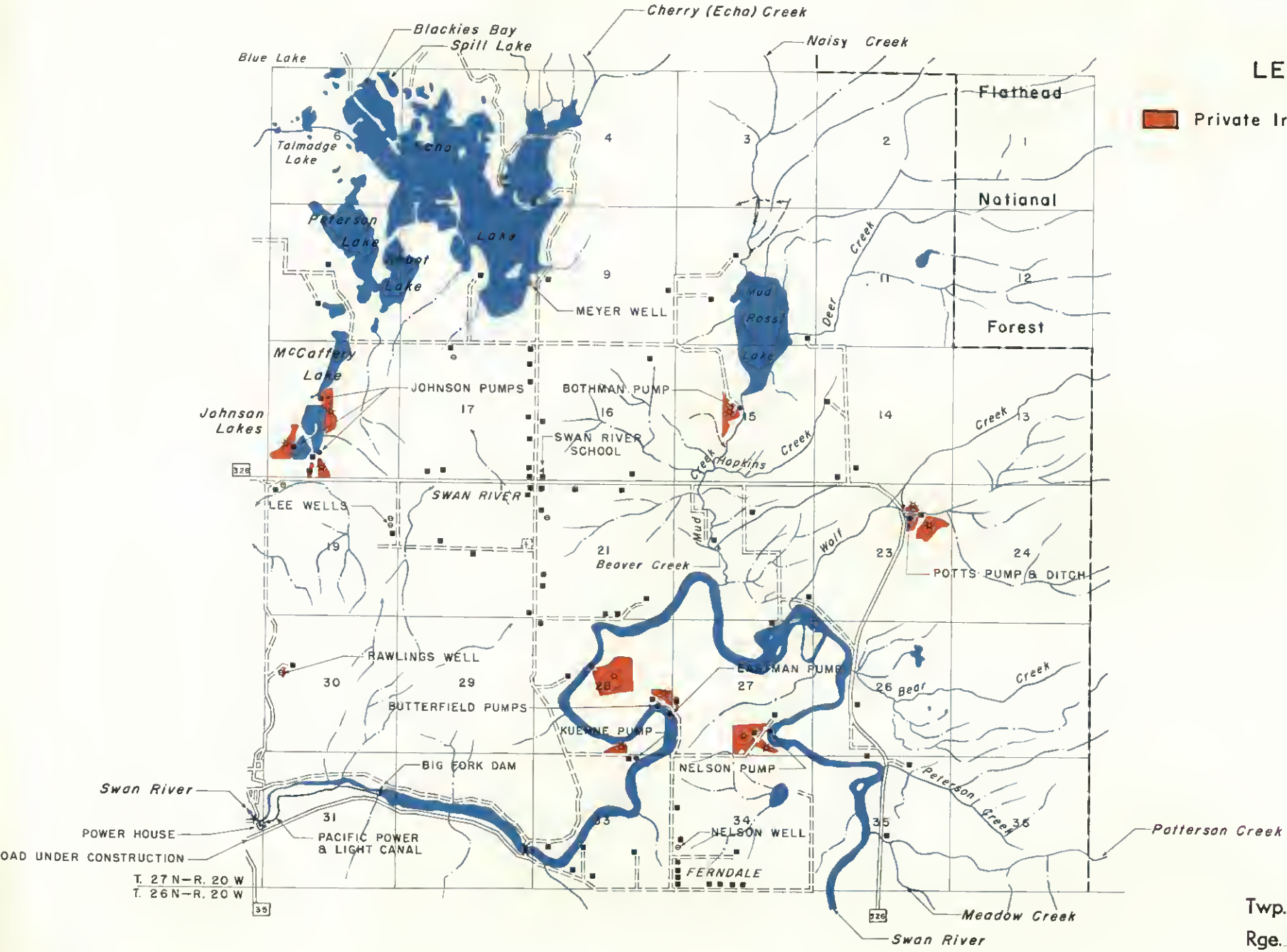


LEGEND

Private Irrigation

Twp. 26 North

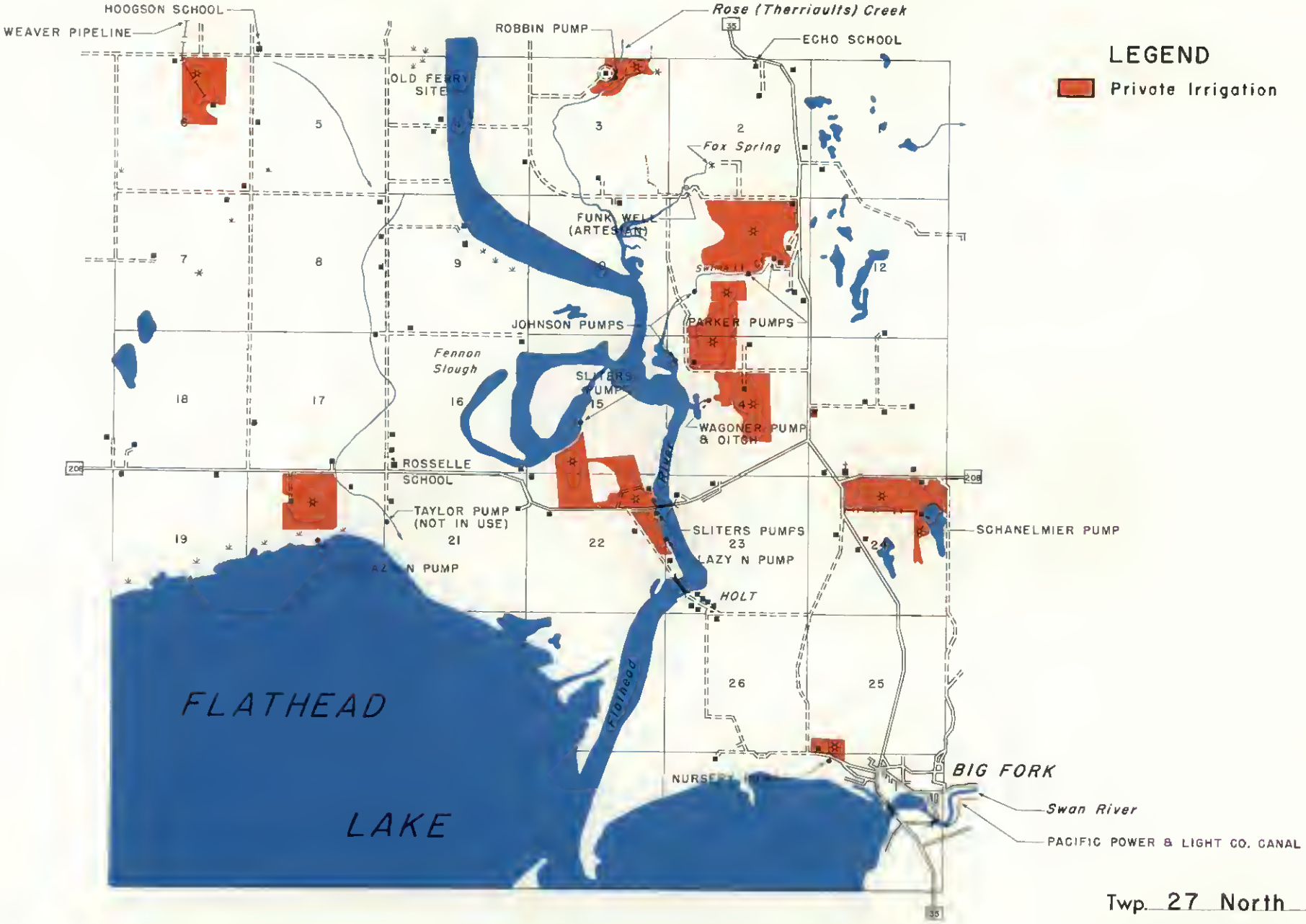
Rge. 26 West

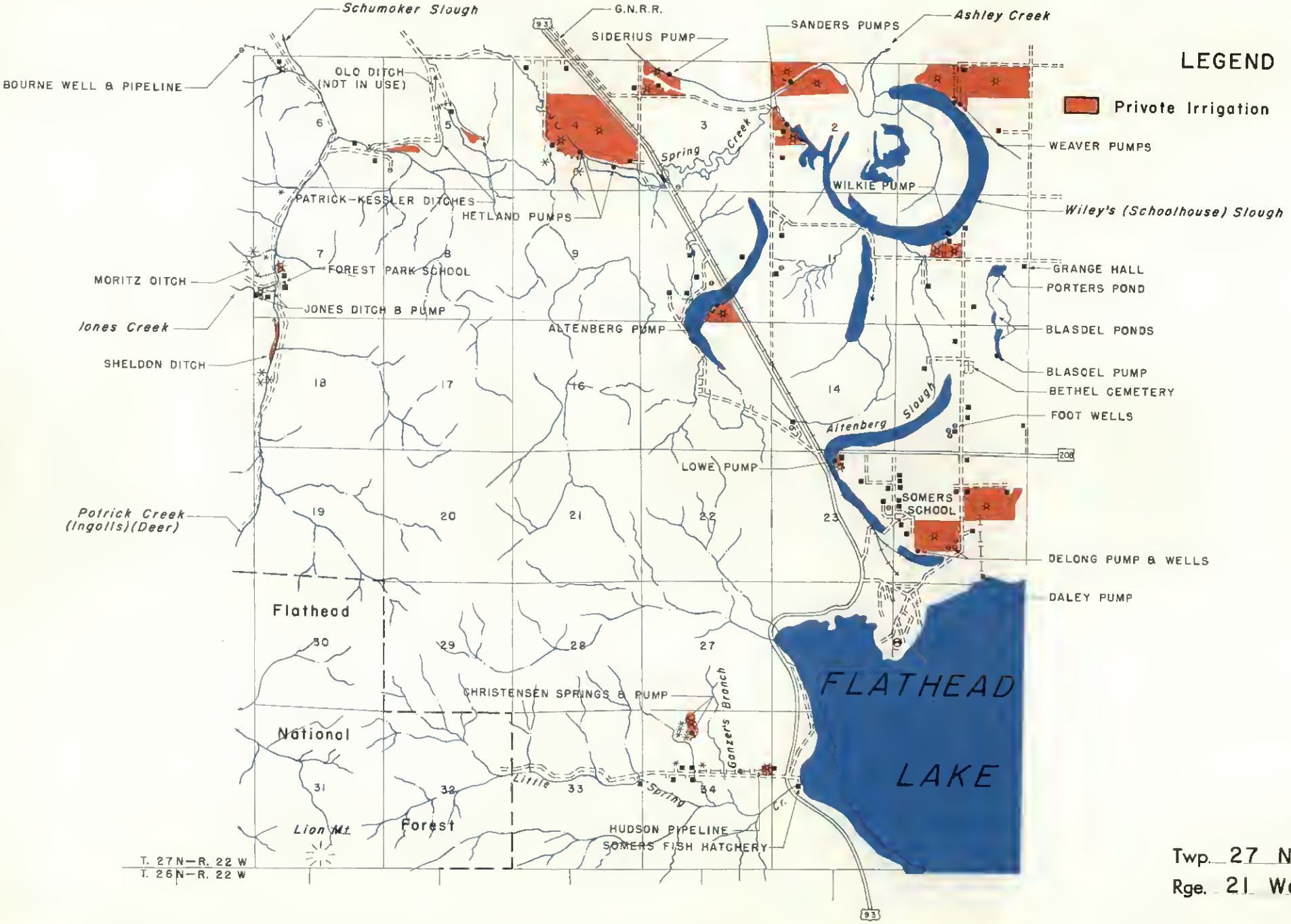


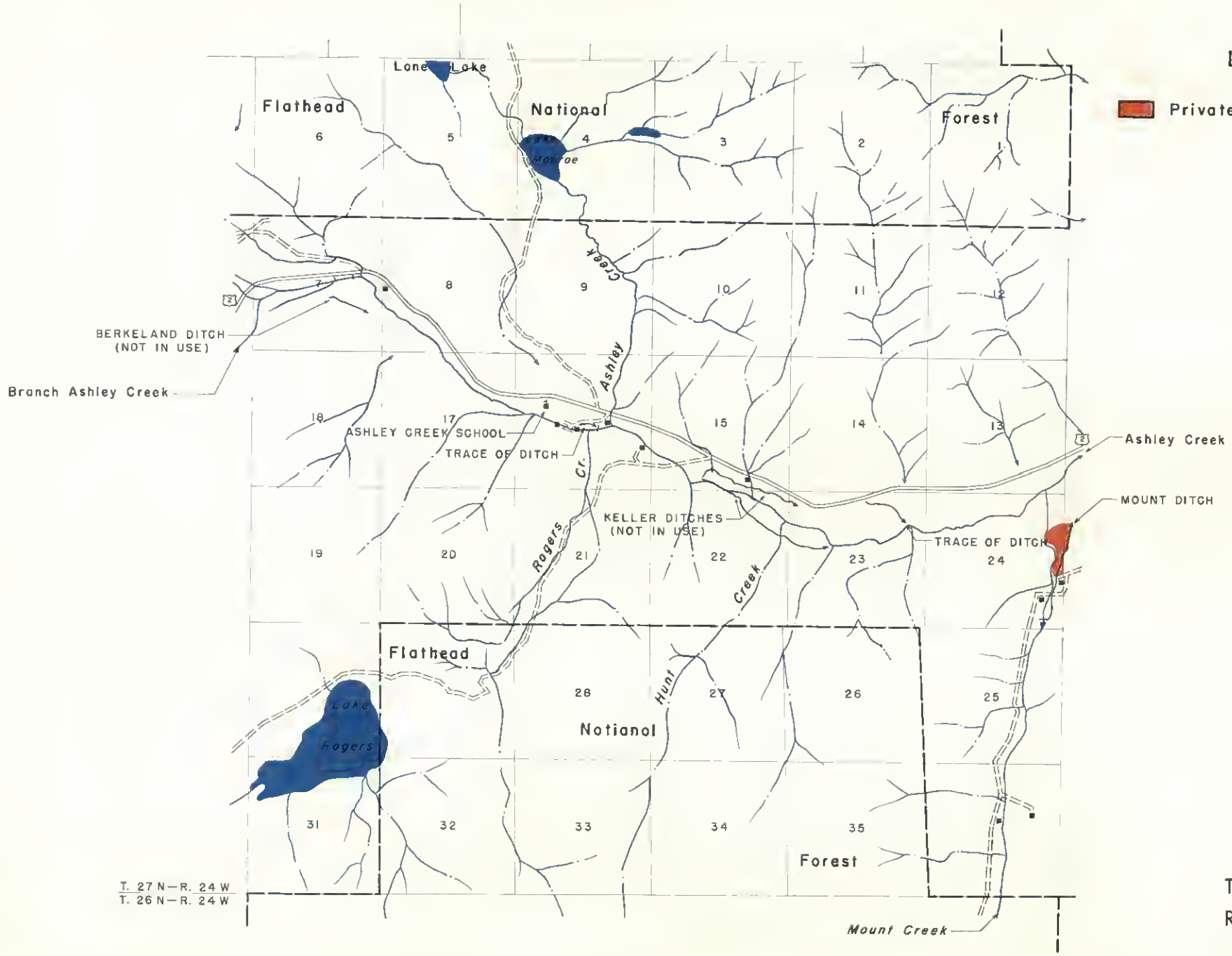
LEGEND

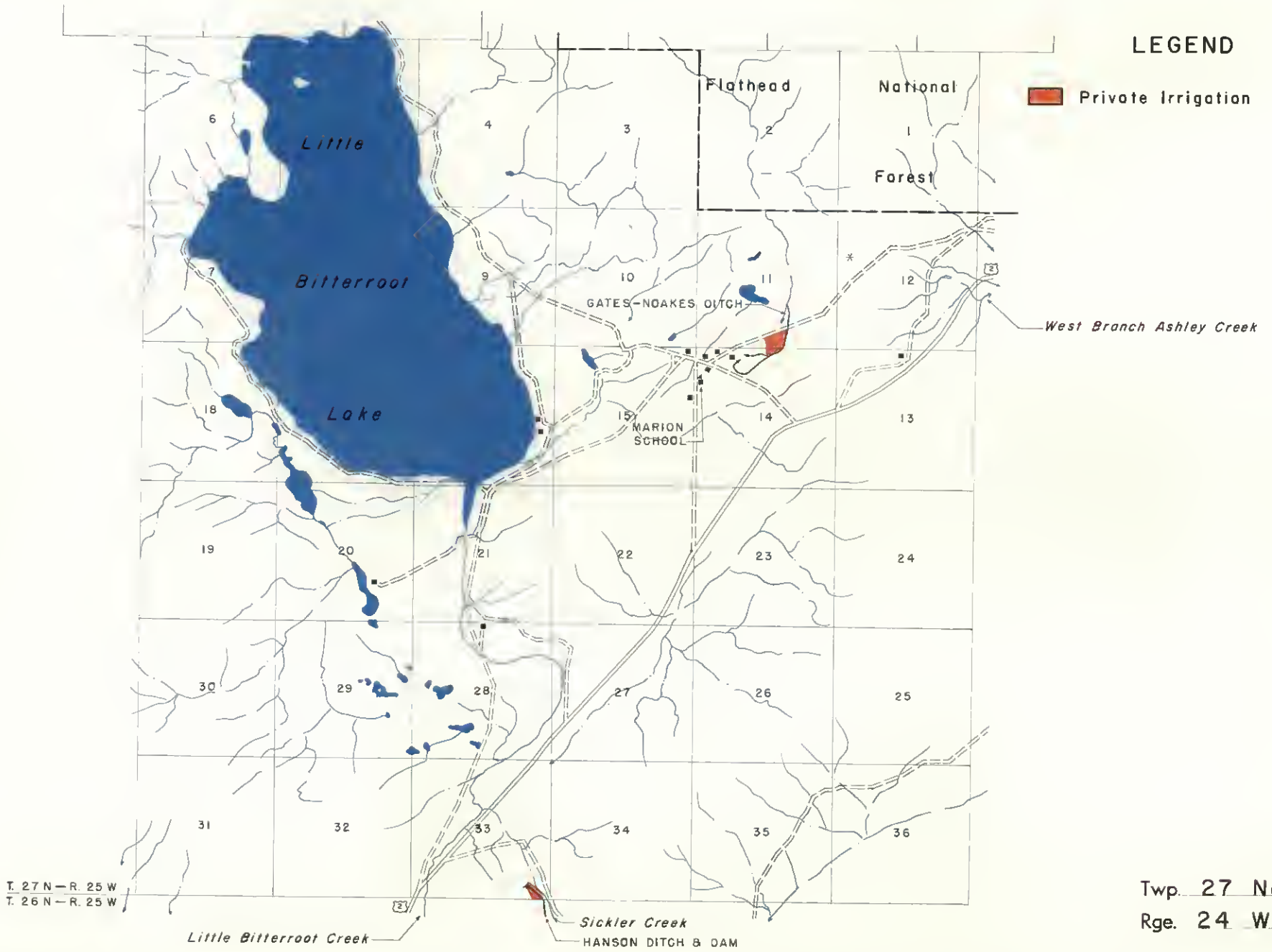
Private Irrigation

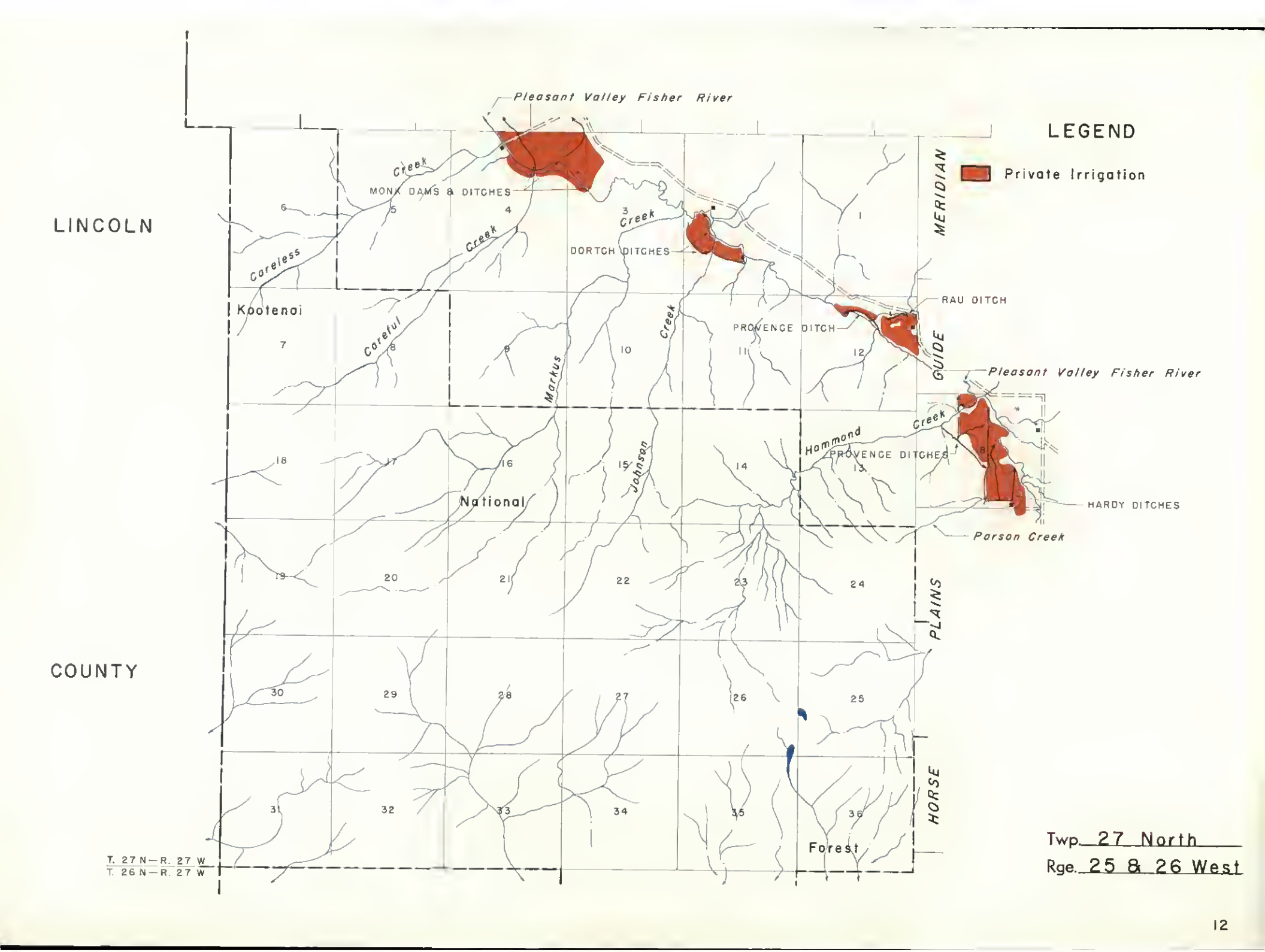
Twp. 27 North
Rge. 19 West

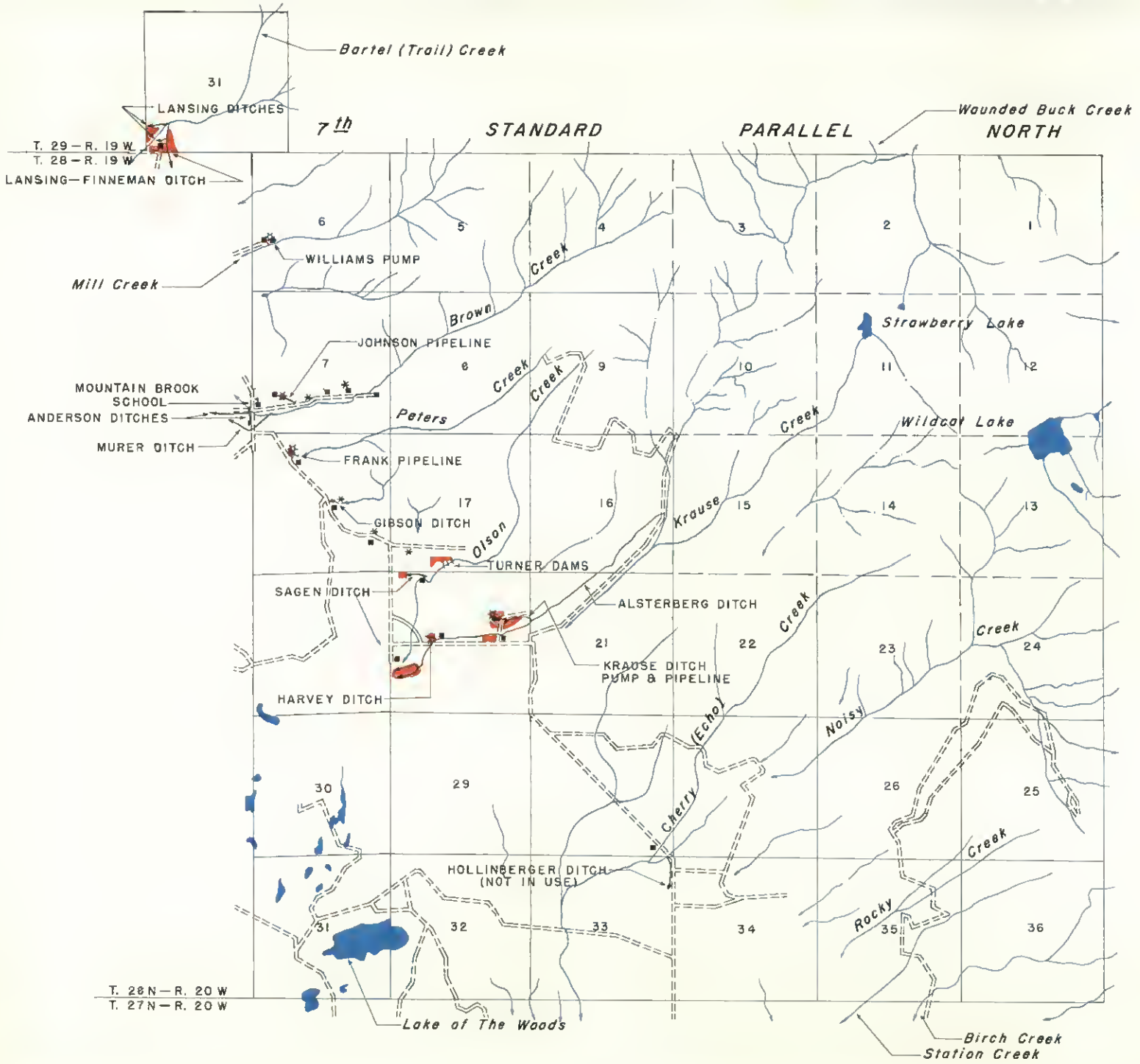

HOOGSON SCHOOL
WEAVER PIPELINE
ROBBIN PUMP
Rose (Therriaults) Creek
ECHO SCHOOL
OLD FERRY SITE
Fox Spring
FUNK WELL (ARTESIAN)
JOHNSON PUMPS
PARKER PUMPS
Fennon Slough
SLITERS PUMP
WAGONER PUMP & DITCH
ROSSELLE SCHOOL
TAYLOR PUMP (NOT IN USE)
SLITERS PUMPS
LAZY N PUMP
SCHANELMIER PUMP
HOLT
FLATHEAD LAKE
Flathead
BIG FORK
Swan River
PACIFIC POWER & LIGHT CO. CANAL
LEGEND
Private Irrigation
Twp. 27 North
Rge. 20 West


Schumoker Slough
G.N.R.R.
SIDERIUS PUMP
SANDERS PUMPS
Ashley Creek
BOURNE WELL & PIPELINE
OLD DITCH (NOT IN USE)
Spring Creek
WEAVER PUMPS
WILKIE PUMP
Wiley's (Schoolhouse) Slough
PATRICK-KESSLER DITCHES
HETLAND PUMPS
MORITZ DITCH
FOREST PARK SCHOOL
GRANGE HALL
PORTERS POND
JONES DITCH & PUMP
Jones Creek
ALTENBERG PUMP
BLASDEL PONDS
SHELDON DITCH
BLASDEL PUMP
BETHEL CEMETERY
FOOT WELLS
Altenberg Slough
LOWE PUMP
SOMERS SCHOOL
Potrick Creek (Ingolls)(Deer)
DELONG PUMP & WELLS
DALEY PUMP
Flathead
National
Forest
CHRISTENSEN SPRINGS & PUMP
Ganzers Branch
Little Spring Cr.
Lion Mt.
HUDSON PIPELINE
SOMERS FISH HATCHERY
FLATHEAD LAKE
T. 27N—R. 22 W
T. 26N—R. 22 W
LEGEND
Privote Irrigation
Twp. 27 North
Rge. 21 West


LEGEND
Private Irrigation
Flathead
National
Forest
Lone Lake
Lake Mary Ronan
Ashley Creek
BERKELAND DITCH
(NOT IN USE)
Branch Ashley Creek
ASHLEY CREEK SCHOOL
TRACE OF DITCH
Rogers Cr.
KELLER DITCHES
(NOT IN USE)
MOUNT DITCH
TRACE OF DITCH
Hunt Creek
Flathead
Notional
Forest
Lake Rogers
Mount Creek
T. 27 N—R. 24 W
T. 26 N—R. 24 W
Twp. 27 North
Rge. 23 West


LEGEND
Private Irrigation
Flathead
National
Forest
Little
Bitterroot
Lake
GATES-NOAKES DITCH
West Branch Ashley Creek
MARION SCHOOL
Sickler Creek
HANSON DITCH & DAM
Little Bitterroot Creek
T. 27 N — R. 25 W
T. 26 N — R. 25 W
Twp. 27 North
Rge. 24 West


LINCOLN
COUNTY
Pleasant Valley Fisher River
LEGEND
Private Irrigation
MERIDIAN
GUIDE
PLAINS
HORSE
Creek
MONK DAMS & DITCHES
Careless
Careful
Markus
Johnson
DORTCH DITCHES
PROVENCE DITCH
RAU DITCH
Pleasant Valley Fisher River
Hammond
PROVENCE DITCHES
HARDY DITCHES
Parson Creek
Kootenai
National
Forest
T. 27 N—R. 27 W
T. 26 N—R. 27 W
Twp. 27 North
Rge. 25 & 26 West

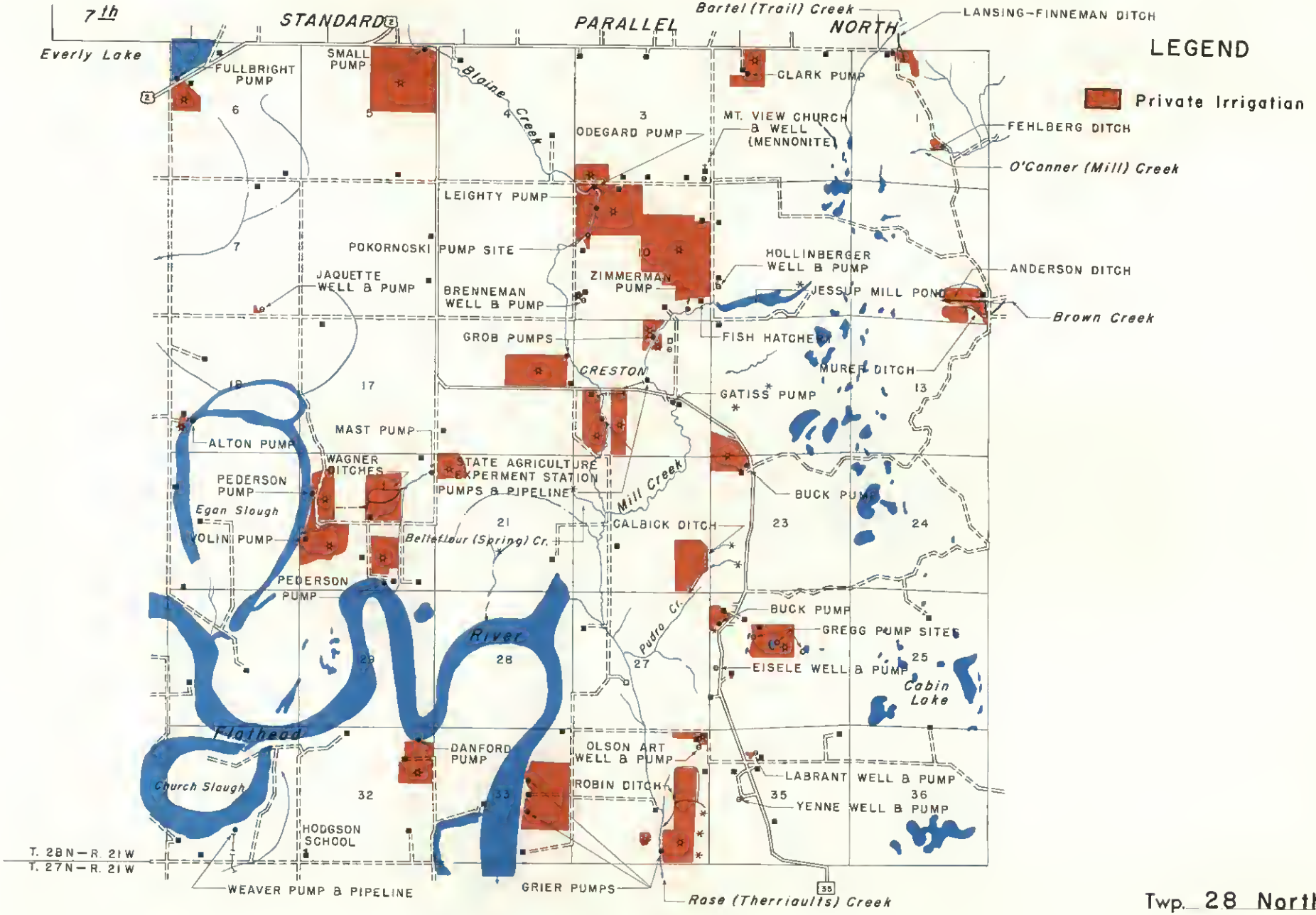


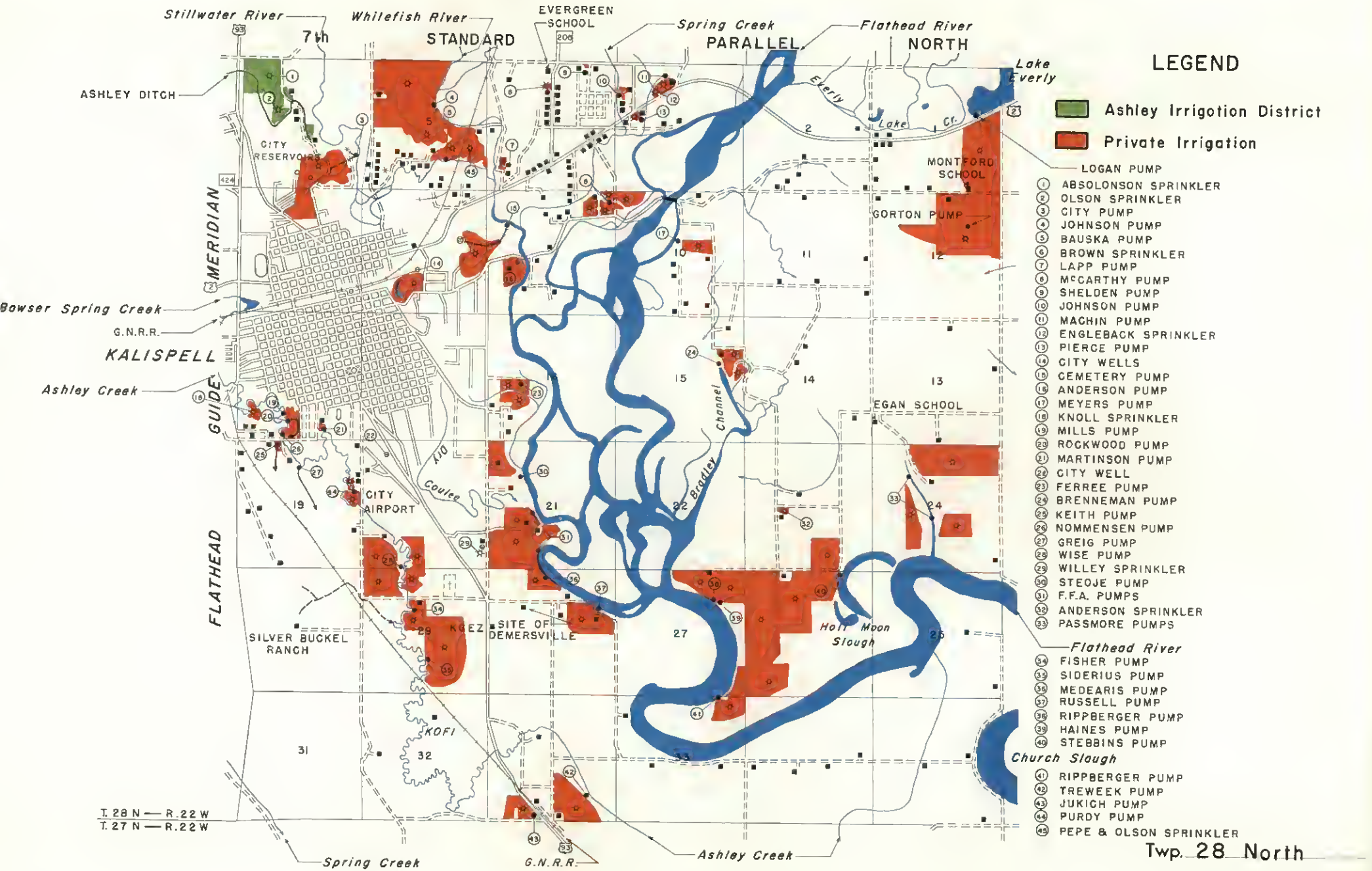
LEGEND

Private Irrigation

Twp. 28 & 29 North

Rge. 19 West


7th
STANDARD
PARALLEL
NORTH
Bartel (Trail) Creek
LANSING-FINNEMAN DITCH
Everly Lake
FULLBRIGHT PUMP
SMALL PUMP
Bloine Creek
CLARK PUMP
MT. VIEW CHURCH & WELL (MENNONITE)
ODEGARD PUMP
FEHLBERG DITCH
O'Conner (Mill) Creek
LEIGHTY PUMP
POKORNOSKI PUMP SITE
HOLLINBERGER WELL & PUMP
ANDERSON DITCH
JAQUETTE WELL & PUMP
ZIMMERMAN PUMP
BRENNEMAN WELL & PUMP
JESSUP MILL POND
Brown Creek
GROB PUMPS
FISH HATCHERY
MUREL DITCH
CRESTON
GATISS PUMP
MAST PUMP
ALTON PUMP
WAGNER DITCHES
STATE AGRICULTURE EXPERMENT STATION PUMPS & PIPELINE
PEDERSON PUMP
Egan Slough
Mill Creek
BUCK PUMP
CALBICK DITCH
YOLIN PUMP
Belfat Lour (Spring) Cr.
PEDERSON PUMP
BUCK PUMP
Pudro Cr.
GREGG PUMP SITES
River
Flathead
EISELE WELL & PUMP
Cabin Lake
DANFORD PUMP
OLSON ART WELL & PUMP
Church Slough
ROBIN DITCH
LABRANT WELL & PUMP
YENNE WELL & PUMP
HODGSON SCHOOL
T. 28N—R. 21W
T. 27N—R. 21W
WEAVER PUMP & PIPELINE
GRIER PUMPS
Rose (Therriaults) Creek
LEGEND
Private Irrigation
Twp. 28 North
Rge. 20 West



LEGEND

- Ashley Irrigation District
- Private Irrigation

LOGAN PUMP

1. ABSOLONSON SPRINKLER
2. OLSON SPRINKLER
3. CITY PUMP
4. JOHNSON PUMP
5. BAUSKA PUMP
6. BROWN SPRINKLER
7. LAPP PUMP
8. McCARTHY PUMP
9. SHELDEN PUMP
10. JOHNSON PUMP
11. MACHIN PUMP
12. ENGLEBACK SPRINKLER
13. PIERCE PUMP
14. CITY WELLS
15. CEMETERY PUMP
16. ANDERSON PUMP
17. MEYERS PUMP
18. KNOLL SPRINKLER
19. MILLS PUMP
20. ROCKWOOD PUMP
21. MARTINSON PUMP
22. CITY WELL
23. FERREE PUMP
24. BRENNEMAN PUMP
25. KEITH PUMP
26. NOMMENSEN PUMP
27. GREIG PUMP
28. WISE PUMP
29. WILLEY SPRINKLER
30. STEOJE PUMP
31. F.F.A. PUMPS
32. ANDERSON SPRINKLER
33. PASSMORE PUMPS

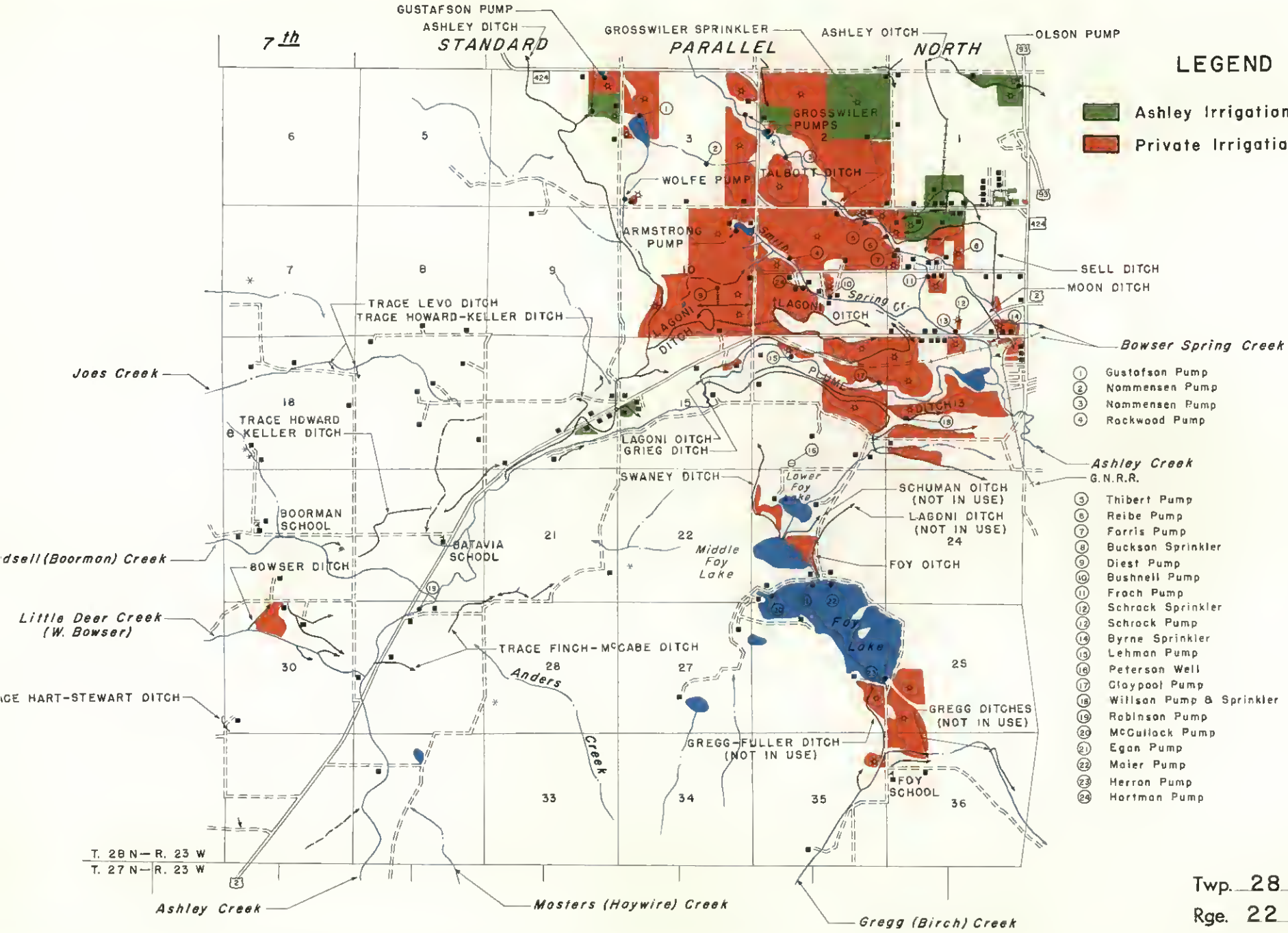
Flathead River

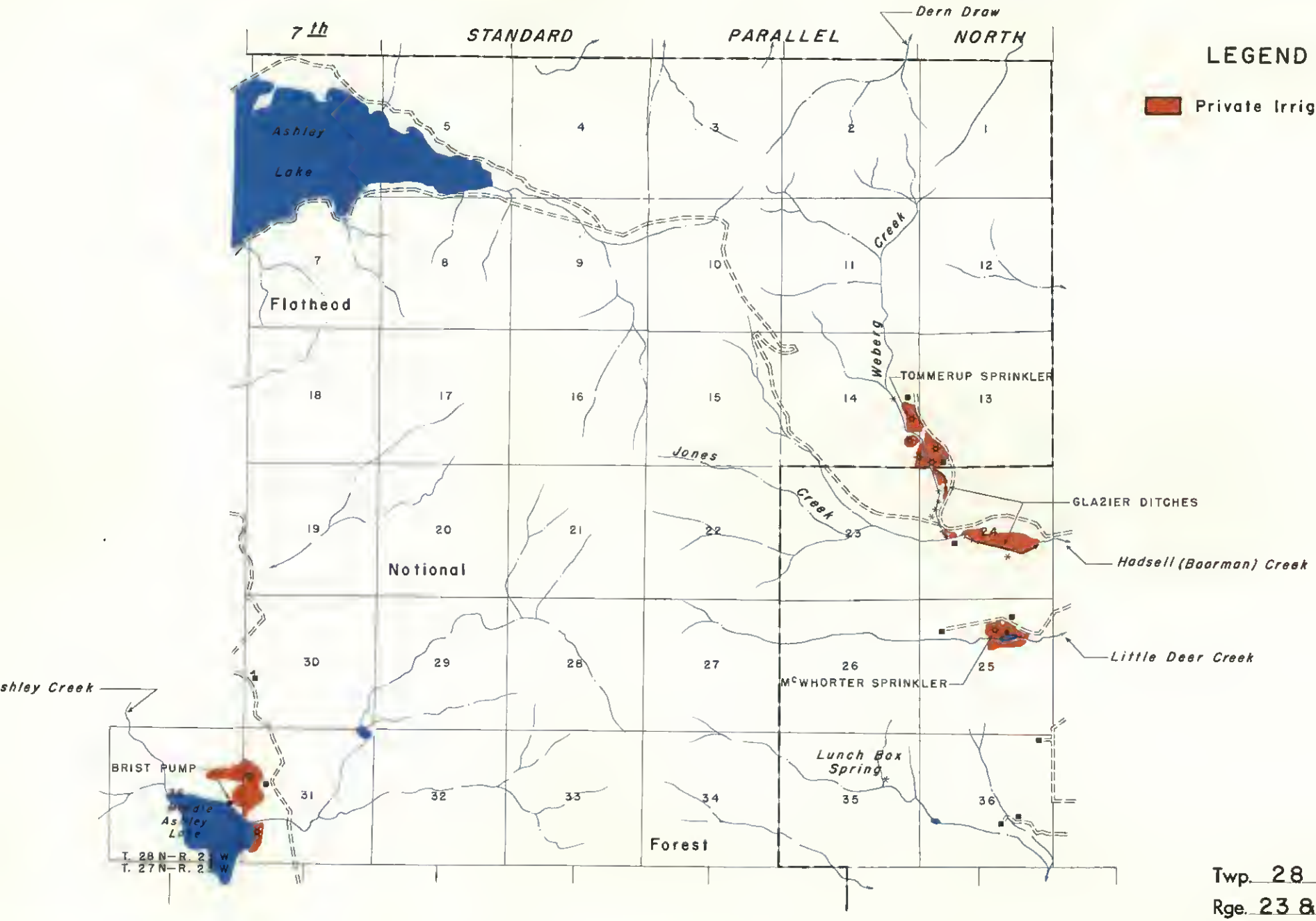
34. FISHER PUMP
35. SIDERIUS PUMP
36. MEDEARIS PUMP
37. RUSSELL PUMP
38. RIPPBERGER PUMP
39. HAINES PUMP
40. STEBBINS PUMP

Church Slough

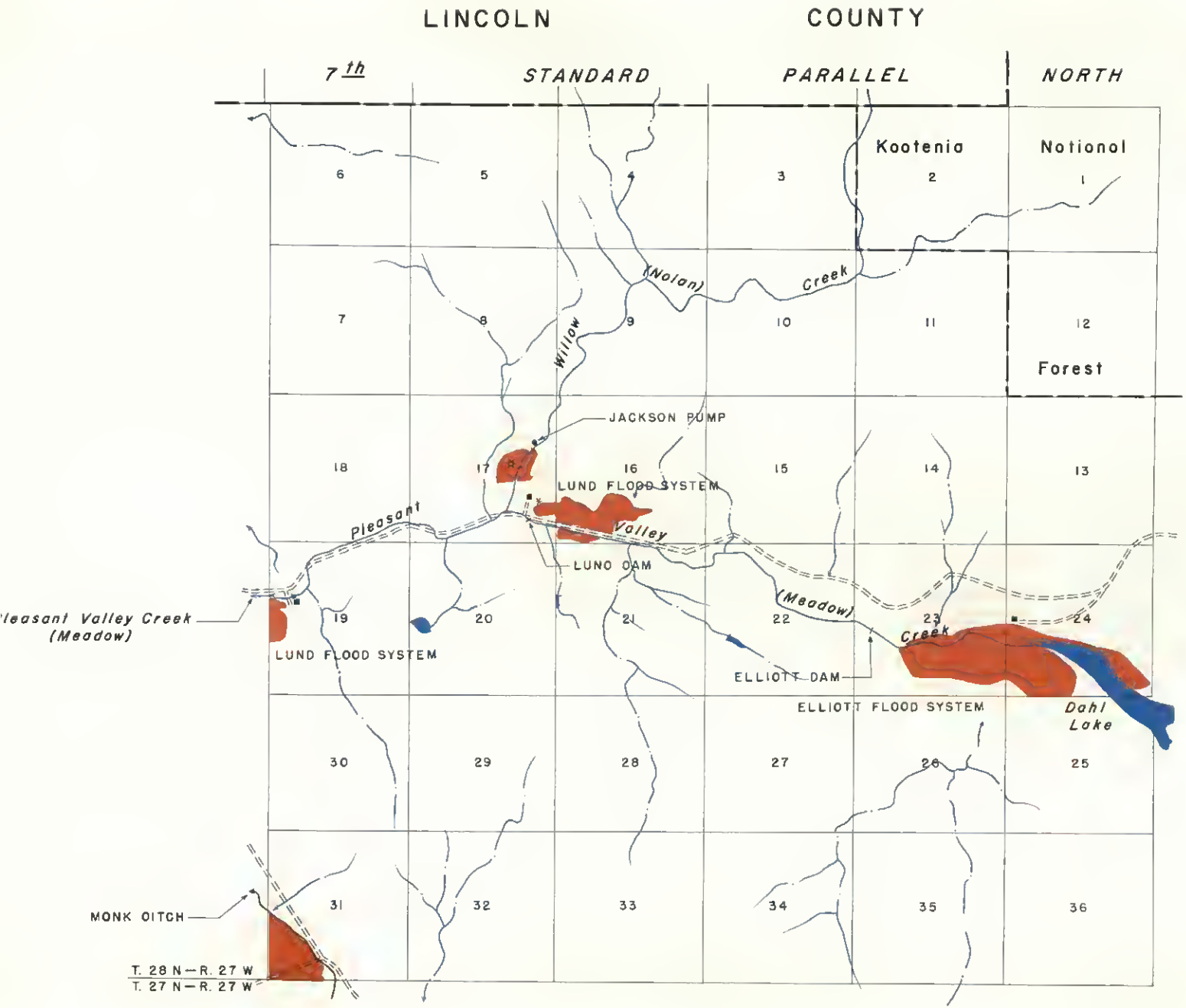
41. RIPPBERGER PUMP
42. TREWEEK PUMP
43. JUKICH PUMP
44. PURDY PUMP
45. PEPE & OLSON SPRINKLER

Twp. 28 North
Rge. 21 West


GUSTAFSON PUMP
ASHLEY DITCH
STANDARD
7th
GROSSWILER SPRINKLER
PARALLEL
ASHLEY DITCH
NORTH
OLSON PUMP
GROSSWILER PUMPS
WOLFE PUMP
TALBOTT DITCH
ARMSTRONG PUMP
Smith
SELL DITCH
MOON DITCH
Spring Cr.
LAGONI DITCH
LAGONI OITCH
Bowser Spring Creek
TRACE LEVO DITCH
TRACE HOWARD-KELLER DITCH
Joes Creek
PRIME DITCH 13
TRACE HOWARD & KELLER DITCH
LAGONI OITCH-GRIEG DITCH
Ashley Creek
G.N.R.R.
SWANEY DITCH
Lower Foy Lake
SCHUMAN OITCH (NOT IN USE)
LAGONI DITCH (NOT IN USE)
BOORMAN SCHOOL
BATAVIA SCHOOL
Middle Foy Lake
FOY DITCH
dsell (Boorman) Creek
BOWSER DITCH
Little Deer Creek (W. Bowser)
TRACE FINCH-McCABE DITCH
Foy Lake
Anders Creek
GREGG DITCHES (NOT IN USE)
GE HART-STEWART DITCH
GREGG-FULLER DITCH (NOT IN USE)
FOY SCHOOL
T. 28 N—R. 23 W
T. 27 N—R. 23 W
Ashley Creek
Mosters (Haywire) Creek
Gregg (Birch) Creek
LEGEND
Ashley Irrigation District
Private Irrigation
1 Gustafson Pump
2 Nommensen Pump
3 Nommensen Pump
4 Rockwood Pump
5 Thibert Pump
6 Reibe Pump
7 Farris Pump
8 Buckson Sprinkler
9 Diest Pump
10 Bushnell Pump
11 Froch Pump
12 Schrock Sprinkler
13 Schrock Pump
14 Byrne Sprinkler
15 Lehman Pump
16 Peterson Well
17 Claypool Pump
18 Willson Pump & Sprinkler
19 Robinson Pump
20 McCullock Pump
21 Egan Pump
22 Maier Pump
23 Herron Pump
24 Hartman Pump
Twp. 28 NORTH
Rge. 22 WEST



Twp. 28 North
Rge. 23 & 24 West



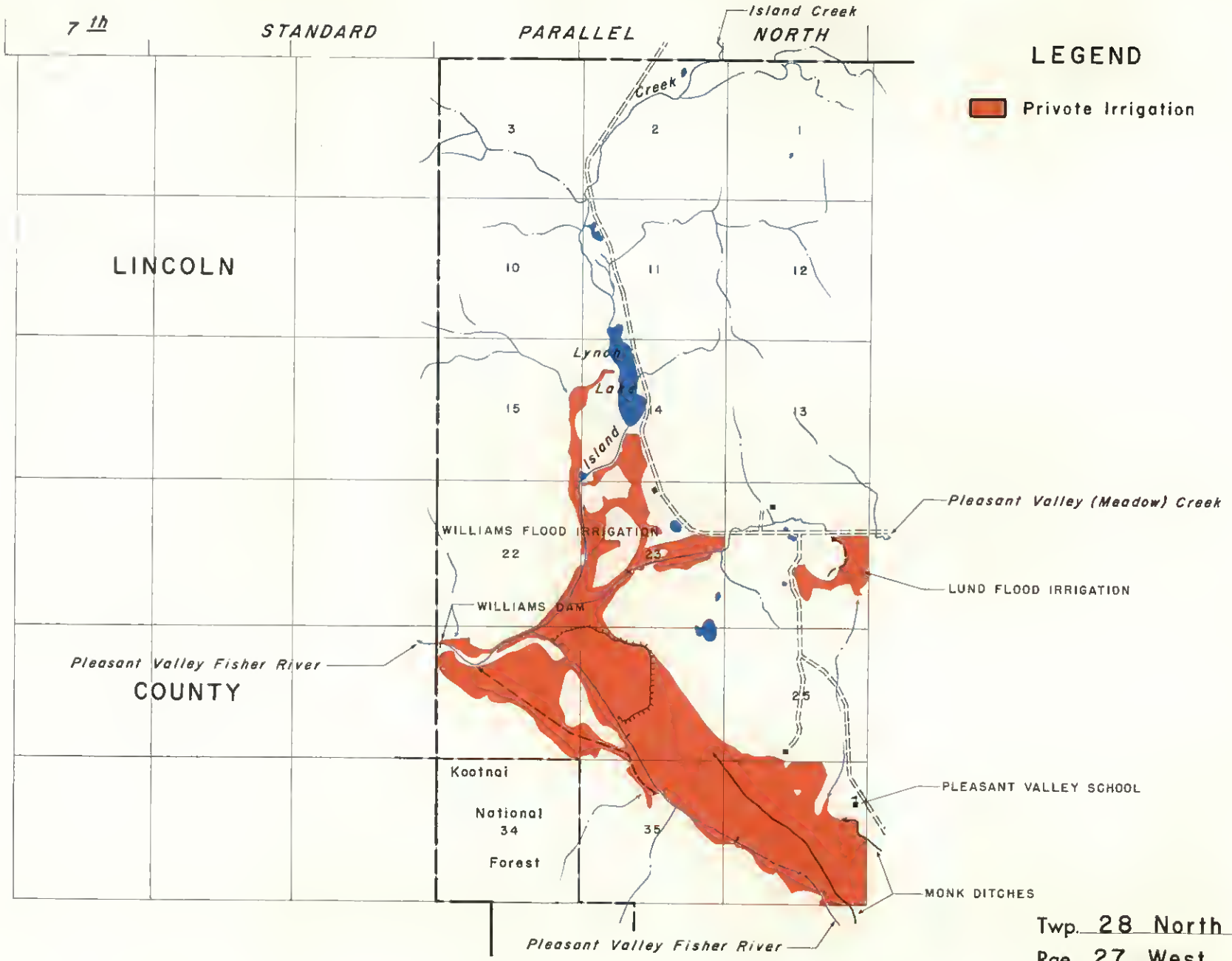
LEGEND

Private Irrigation

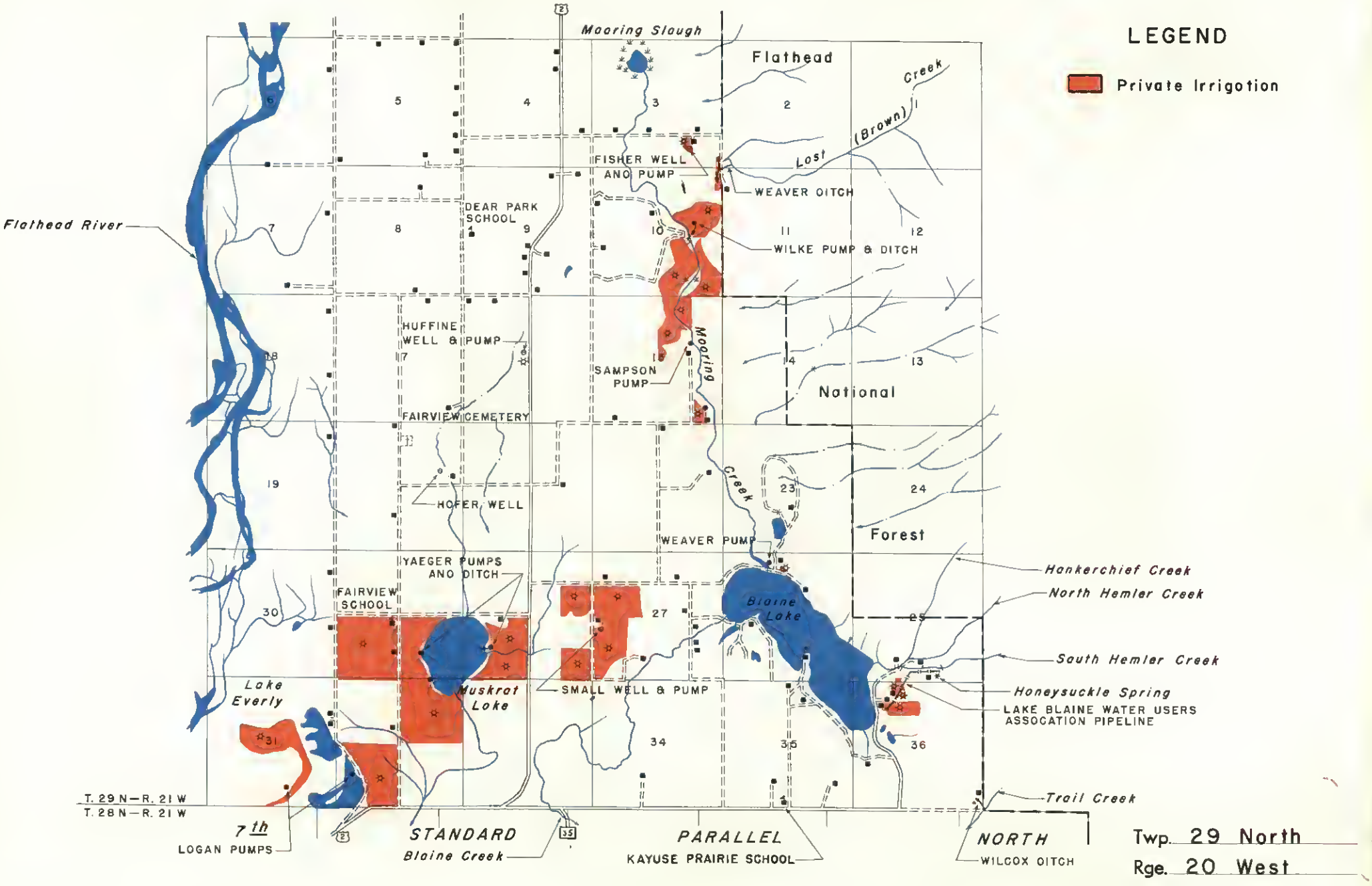
Twp. 28 North

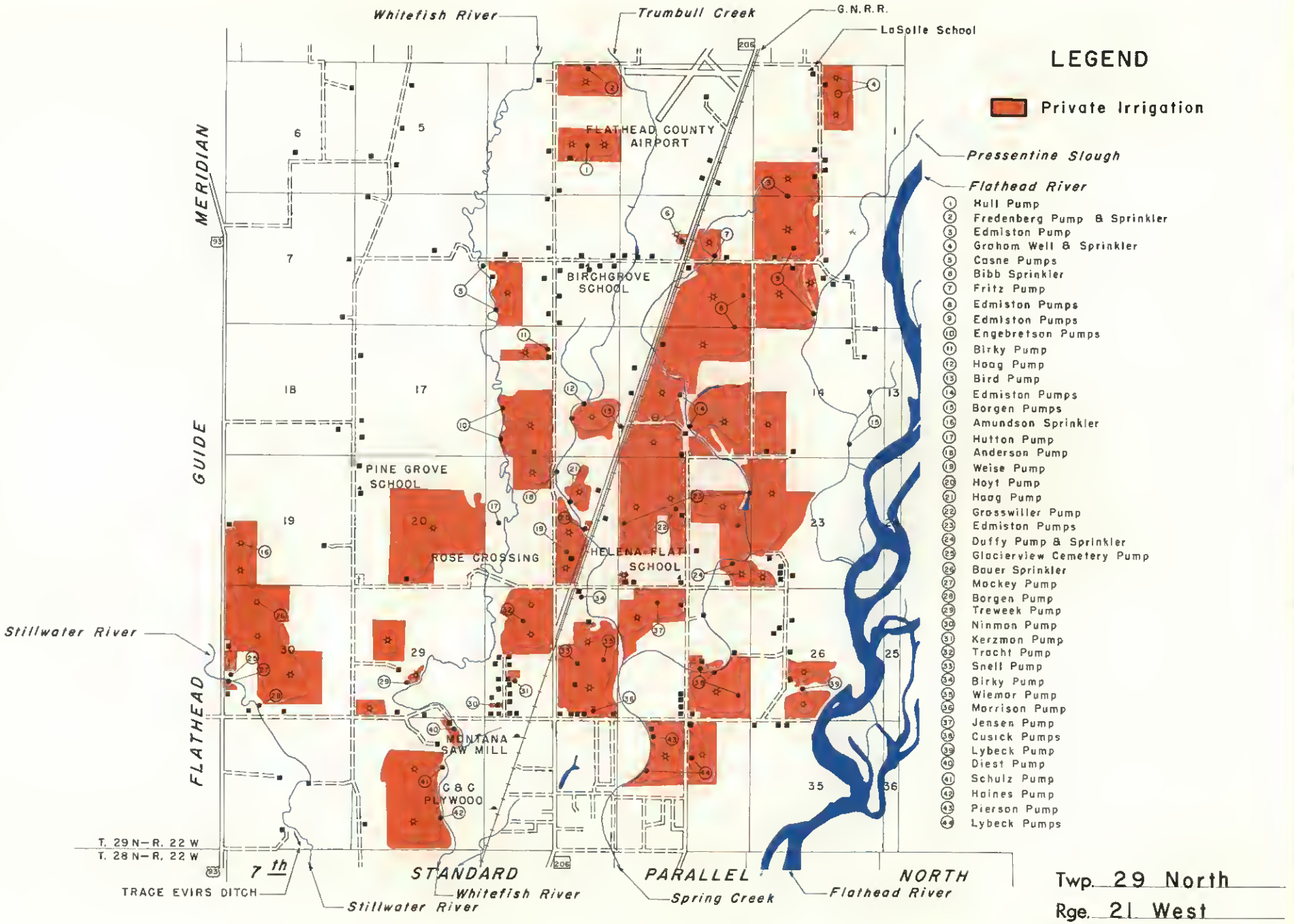
Rge. 26 West

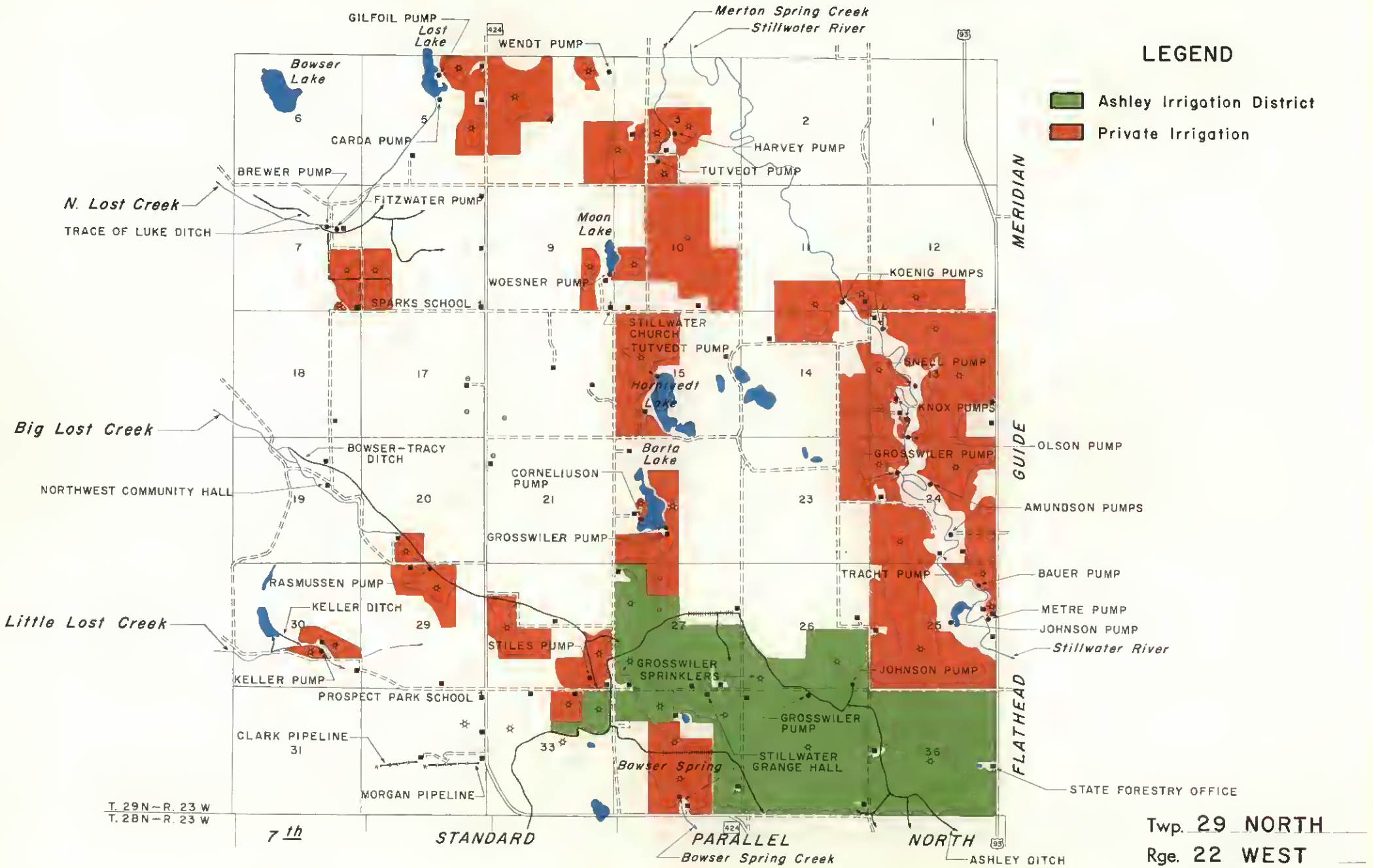
LINCOLN COUNTY

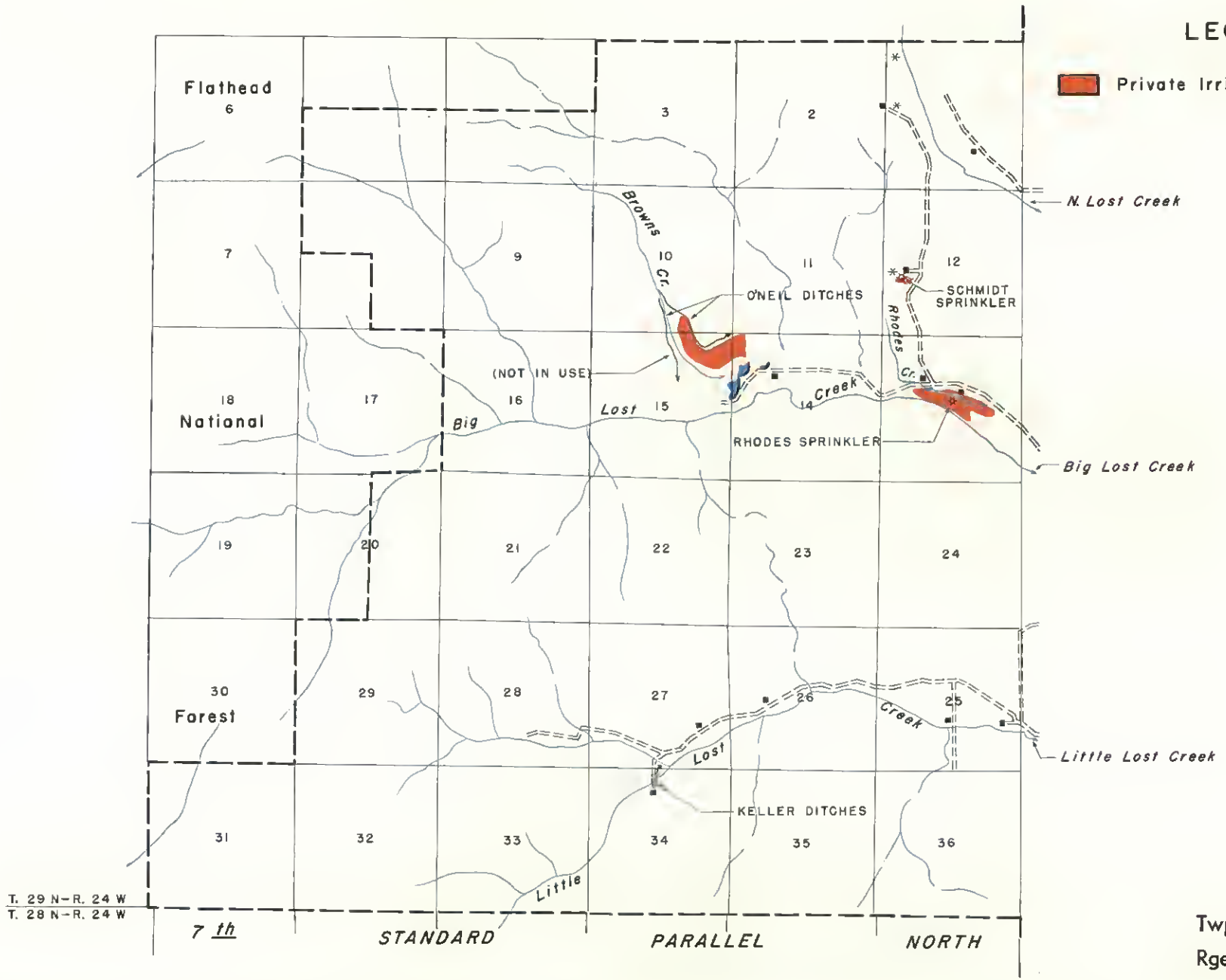


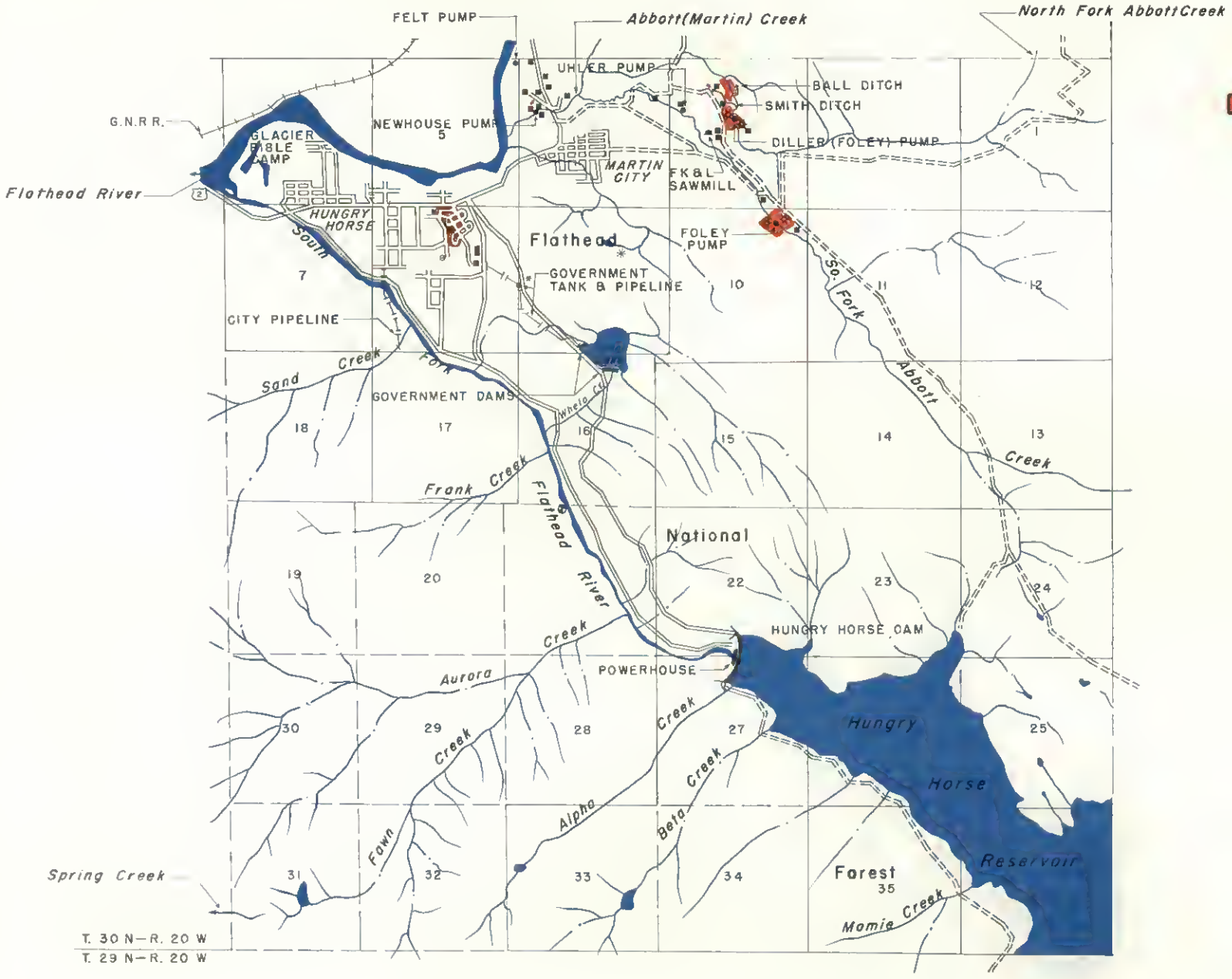
Twp. 28 North
Rge. 27 West

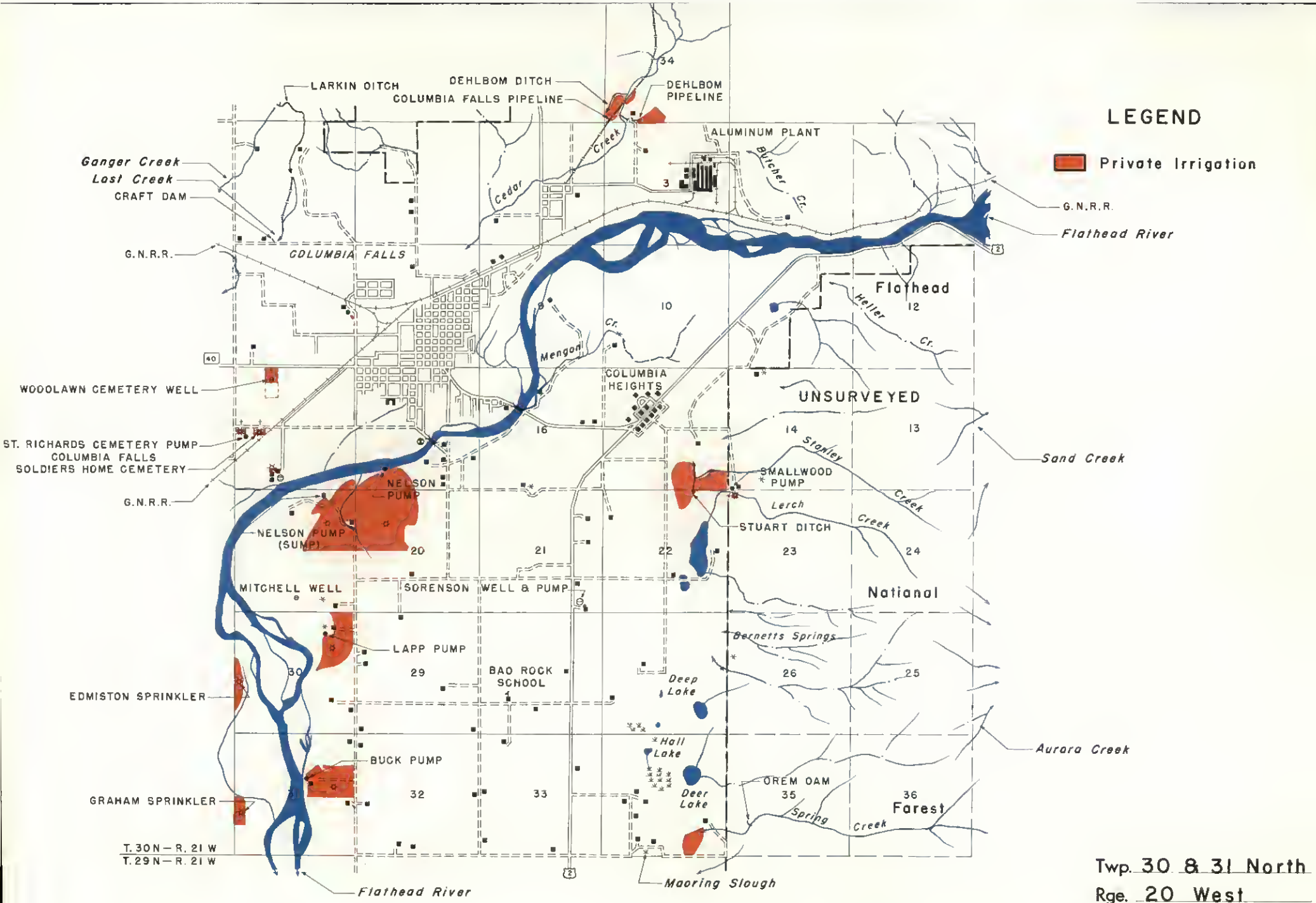

LEGEND
Private Irrigation
Flathead River
Mooring Slough
Flathead
Creek
(Brown)
Lost
FISHER WELL AND PUMP
WEAVER DITCH
DEAR PARK SCHOOL
WILKE PUMP & DITCH
HUFFINE WELL & PUMP
SAMPSON PUMP
Mooring
National
FAIRVIEW CEMETERY
HOFER WELL
Creek
Forest
WEAVER PUMP
YAEGER PUMPS AND DITCH
FAIRVIEW SCHOOL
Blaine Lake
Hankerchief Creek
North Hemler Creek
South Hemler Creek
Honeysuckle Spring
LAKE BLAINE WATER USERS ASSOCIATION PIPELINE
Lake Everly
Muskrat Lake
SMALL WELL & PUMP
Trail Creek
T. 29 N—R. 21 W
T. 28 N—R. 21 W
7th
LOGAN PUMPS
STANDARD
Blaine Creek
PARALLEL
KAYUSE PRAIRIE SCHOOL
NORTH
WILCOX DITCH
Twp. 29 North
Rge. 20 West


Whitefish River
Trumbull Creek
G.N.R.R.
LaSalle School
FLATHEAD COUNTY AIRPORT
BIRCHGROVE SCHOOL
PINE GROVE SCHOOL
ROSE CROSSING
HELENA FLAT SCHOOL
MONTANA SAW MILL
C & C PLYWOOD
MERIDIAN
GUIDE
FLATHEAD
Stillwater River
Pressentine Slough
Flathead River
T. 29 N – R. 22 W
T. 28 N – R. 22 W
7th
STANDARD
PARALLEL
NORTH
TRACE EVIRS DITCH
Stillwater River
Whitefish River
Spring Creek
Flathead River
LEGEND
Private Irrigation
1 Hull Pump
2 Fredenberg Pump & Sprinkler
3 Edmiston Pump
4 Grohom Well & Sprinkler
5 Casne Pumps
6 Bibb Sprinkler
7 Fritz Pump
8 Edmiston Pumps
9 Edmiston Pumps
10 Engebretson Pumps
11 Birky Pump
12 Hoag Pump
13 Bird Pump
14 Edmiston Pumps
15 Borgen Pumps
16 Amundson Sprinkler
17 Hutton Pump
18 Anderson Pump
19 Weise Pump
20 Hoyt Pump
21 Hoag Pump
22 Grosswiller Pump
23 Edmiston Pumps
24 Duffy Pump & Sprinkler
25 Glacierview Cemetery Pump
26 Bauer Sprinkler
27 Mockey Pump
28 Borgen Pump
29 Treweek Pump
30 Ninmon Pump
31 Kerzmon Pump
32 Trocht Pump
33 Snell Pump
34 Birky Pump
35 Wiemor Pump
36 Morrison Pump
37 Jensen Pump
38 Cusick Pumps
39 Lybeck Pump
40 Diest Pump
41 Schulz Pump
42 Haines Pump
43 Pierson Pump
44 Lybeck Pumps
Twp. 29 North
Rge. 21 West

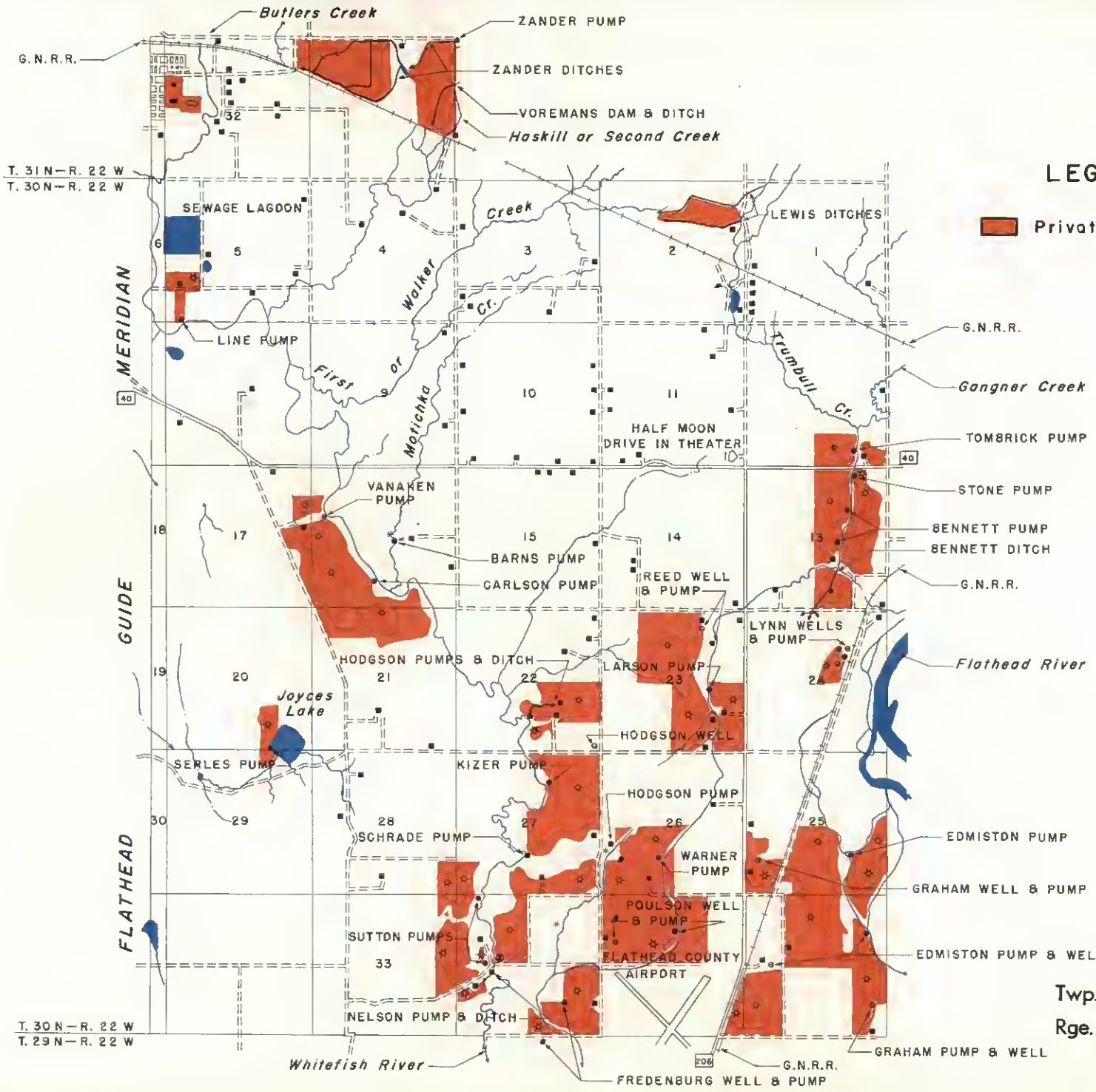

LEGEND
Ashley Irrigation District
Private Irrigation
GILFOIL PUMP
Lost Lake
WENDT PUMP
Merton Spring Creek
Stillwater River
Bowser Lake
CARDA PUMP
HARVEY PUMP
TUTVEDT PUMP
BREWER PUMP
N. Lost Creek
TRACE OF LUKE DITCH
FITZWATER PUMP
Moon Lake
WOESNER PUMP
SPARKS SCHOOL
KOENIG PUMPS
STILLWATER CHURCH
TUTVEDT PUMP
SNELL PUMP
Hornbedt Lake
KNOX PUMPS
Big Lost Creek
BOWSER-TRACY DITCH
Borta Lake
OLSON PUMP
CORNELIUSON PUMP
GROSSWILER PUMP
NORTHWEST COMMUNITY HALL
AMUNDSON PUMPS
RASMUSSEN PUMP
TRACHT PUMP
BAUER PUMP
KELLER DITCH
METRE PUMP
Little Lost Creek
JOHNSON PUMP
Stillwater River
STILES PUMP
GROSSWILER SPRINKLERS
JOHNSON PUMP
KELLER PUMP
PROSPECT PARK SCHOOL
GROSSWILER PUMP
CLARK PIPELINE
STILLWATER GRANGE HALL
Bowser Spring
STATE FORESTRY OFFICE
MORGAN PIPELINE
MERIDIAN
GUIDE
FLATHEAD
T. 29N-R. 23 W
T. 28N-R. 23 W
7th STANDARD PARALLEL NORTH
Bowser Spring Creek
ASHLEY DITCH
Twp. 29 NORTH
Rge. 22 WEST

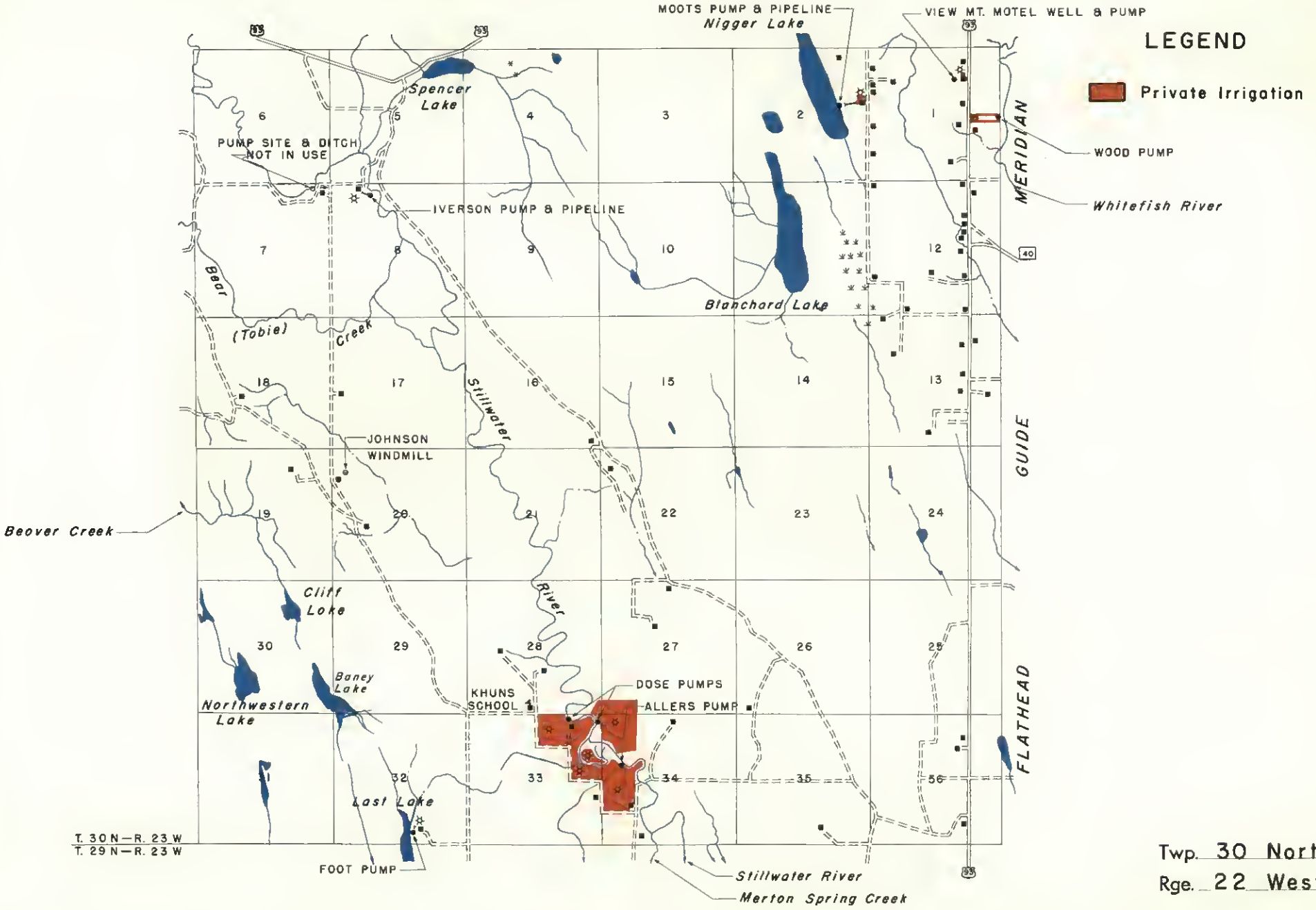

LEGEND
Private Irrigation
Flathead
National
Forest
Browns Cr.
O'NEIL DITCHES
(NOT IN USE)
SCHMIDT SPRINKLER
Rhodes Cr.
RHODES SPRINKLER
Big Lost Creek
N. Lost Creek
Little Lost Creek
KELLER DITCHES
Big Lost Creek
Little Lost Creek
T. 29 N-R. 24 W
T. 28 N-R. 24 W
7 th STANDARD PARALLEL NORTH
Twp. 29 North
Rge. 23 West

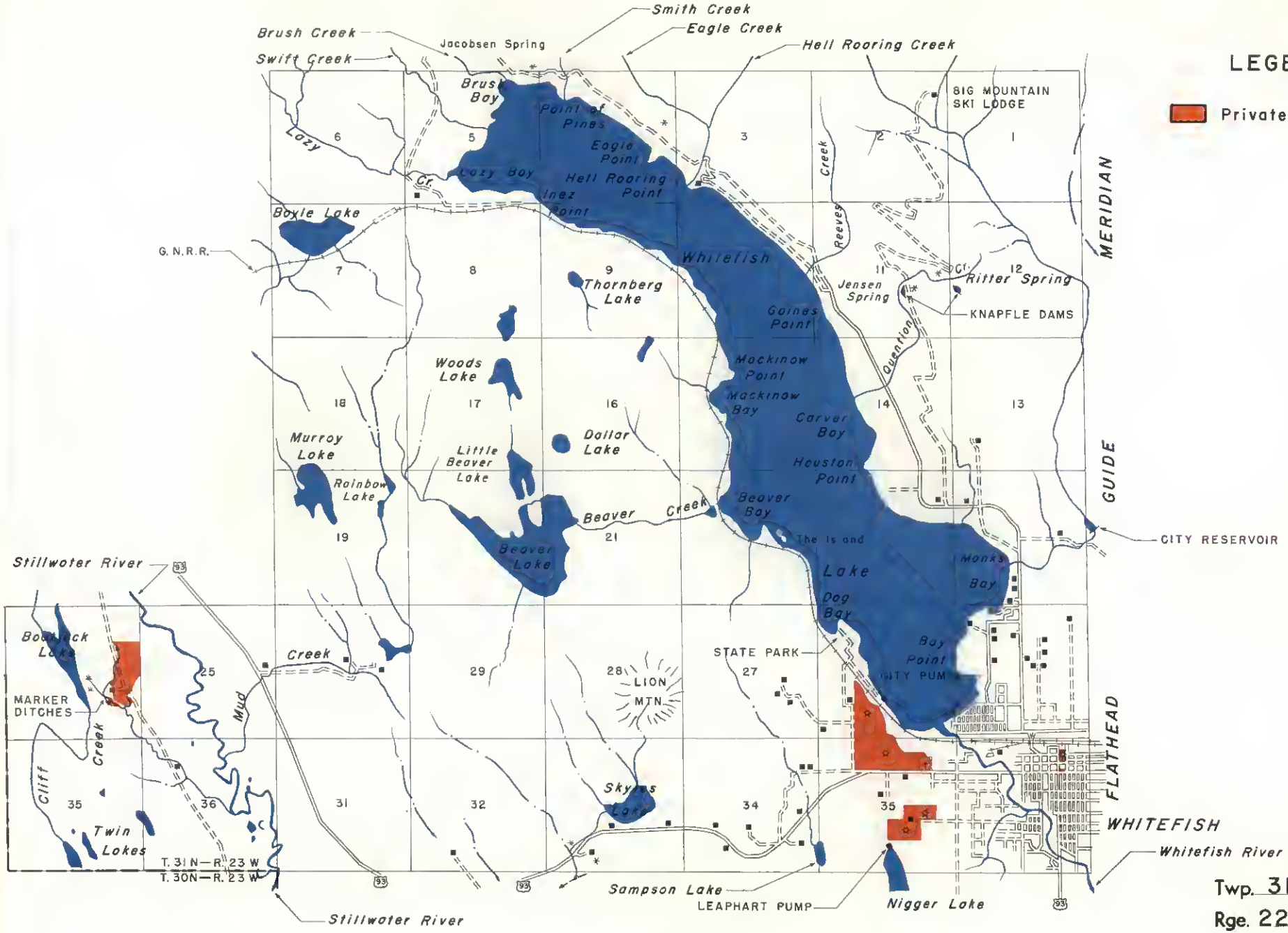

FELT PUMP
Abbott(Martin) Creek
North Fork Abbott Creek
UHLER PUMP
BALL DITCH
SMITH DITCH
DILLER (FOLEY) PUMP
G.N.R.R.
GLACIER BIBLE CAMP
NEWHOUSE PUMP 5
MARTIN CITY
FK&L SAWMILL
Flathead River
HUNGRY HORSE
South Fork
Flathead
FOLEY PUMP
GOVERNMENT TANK & PIPELINE
So. Fork Abbott Creek
CITY PIPELINE
Sand Creek
GOVERNMENT DAMS
Wheeler Ck.
Frank Creek
Flathead River
National
HUNGRY HORSE DAM
POWERHOUSE
Aurora Creek
Fawn Creek
Alpha Creek
Beta Creek
Hungry Horse Reservoir
Forest
Momie Creek
Spring Creek
T. 30 N—R. 20 W
T. 29 N—R. 20 W
LEGEND
Private Irrigation
Twp. 30 North
Rge. 19 West



Twp. 30 & 31 North
Rge. 20 West


Butlers Creek
ZANDER PUMP
G.N.R.R.
ZANDER DITCHES
VOREMANS DAM & DITCH
Haskill or Second Creek
T. 31 N—R. 22 W
T. 30 N—R. 22 W
SEWAGE LAGOON
LEWIS DITCHES
Walker Cr.
MERIDIAN
LINE PUMP
First or Motichka Cr.
Trumbull Cr.
G.N.R.R.
Gangner Creek
HALF MOON DRIVE IN THEATER
TOMBRICK PUMP
VANAKEN PUMP
STONE PUMP
BENNETT PUMP
BENNETT DITCH
BARNS PUMP
CARLSON PUMP
REED WELL & PUMP
G.N.R.R.
GUIDE
LYNN WELLS & PUMP
HODGSON PUMPS & DITCH
LARSON PUMP
Flathead River
Joyces Lake
HODGSON WELL
SERLES PUMP
KIZER PUMP
HODGSON PUMP
SCHRADE PUMP
EDMISTON PUMP
WARNER PUMP
GRAHAM WELL & PUMP
POULSON WELL & PUMP
SUTTON PUMPS
FLATHEAD COUNTY AIRPORT
EDMISTON PUMP & WELL
FLATHEAD
NELSON PUMP & DITCH
T. 30 N—R. 22 W
T. 29 N—R. 22 W
Whitefish River
G.N.R.R.
GRAHAM PUMP & WELL
FREDENBURG WELL & PUMP
LEGEND
Private Irrigation
Twp. 30 & 31 North
Rge. 21 West


MOOTS PUMP & PIPELINE
Nigger Lake
VIEW MT. MOTEL WELL & PUMP
LEGEND
Private Irrigation
Spencer Lake
PUMP SITE & DITCH NOT IN USE
IVERSON PUMP & PIPELINE
WOOD PUMP
Whitefish River
MERIDIAN
Bear (Tobie) Creek
Blanchard Lake
Stillwater
JOHNSON WINDMILL
GUIDE
Beover Creek
Cliff Lake
River
Baney Lake
Northwestern Lake
KHUNS SCHOOL
DOSE PUMPS
ALLERS PUMP
FLATHEAD
Last Lake
FOOT PUMP
Stillwater River
Merton Spring Creek
T. 30 N—R. 23 W
T. 29 N—R. 23 W
Twp. 30 North
Rge. 22 West


Brush Creek
Swift Creek
Jacobsen Spring
Smith Creek
Eagle Creek
Hell Rooring Creek
SIG MOUNTAIN SKI LODGE
Brush Bay
Point of Pines
Eagle Point
Lazy Bay
Hell Rooring Point
Inez Point
Lazy Cr.
Boyle Lake
G.N.R.R.
Whitefish
Reeves Creek
Jensen Spring
Ritter Spring
KNAPFLE DAMS
Thornberg Lake
Goines Point
Woods Lake
Mackinow Point
Mackinow Bay
Carver Bay
Houston Point
Dollar Lake
Murroy Lake
Little Beaver Lake
Rainbow Lake
Beaver Creek
Beaver Bay
Beaver Lake
The Island Lake
Monks Bay
Dog Bay
Bay Point
CITY RESERVOIR
Stillwater River
Creek
STATE PARK
LION MTN.
MARKER DITCHES
Cliff Creek
Mud
Skyles Lake
Twin Lakes
T. 31 N—R. 23 W
T. 30N—R. 23 W
Sampson Lake
LEAPHART PUMP
Nigger Lake
Whitefish River
Stillwater River
GUIDE
MERIDIAN
FLATHEAD
WHITEFISH
LEGEND
Private Irrigation
Twp. 31 North
Rge. 22 & 23 West